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HOW THE GRAND PRIX WAS RUN AND WON

By W. F. BRADLEY.

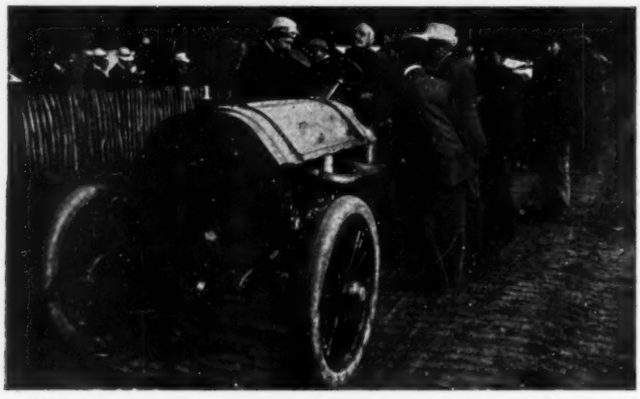
LE MANS, FRANCE, June 27.—The ground over which the greatest automobile race the world has ever seen—despite the absence of two Anglo-Saxon nations whose presence had been hoped for, is an equilateral triangle with the town of Le Mans hanging on to its western corner, Saint Calais on its eastern end, and the sleepy old-world town of La Ferté-Bernard standing guard over its most northern point. Nature has been kind and has held back none of the requisites for a perfect road race. The Commission Sportive—to give the exact French title of the body fulfilling the duties of the racing board—has come to the aid of nature and together they have created a course which has never yet been equaled in the history of the sport of automobile road racing. When Chairman Thompson congratulated M. René de Knyff, the chairman of the Commission Sportive, on the wonderful organization, the businesslike chevalier received the compliment quite naturally, and said, "You see we have been so long at this sort of thing that we ought to do it well now."

How the Great Race Was Started.

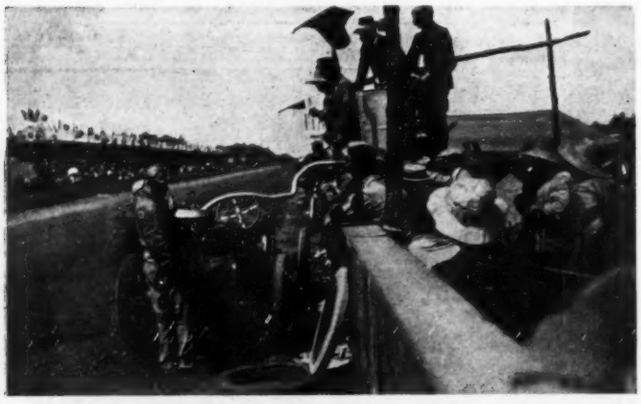
A long file of cars, the continued shrieking of wierd sirens, the thundering of open exhausts on touring would-be racing cars, clouds of dust and a cold breeze are the recollections of the run out from Le Mans to the grandstands in the

SZISZ, THE WINNER, GOING THROUGH CONNERE, WHERE SUBSTANTIAL FENCES GUARDED THE COURSE.

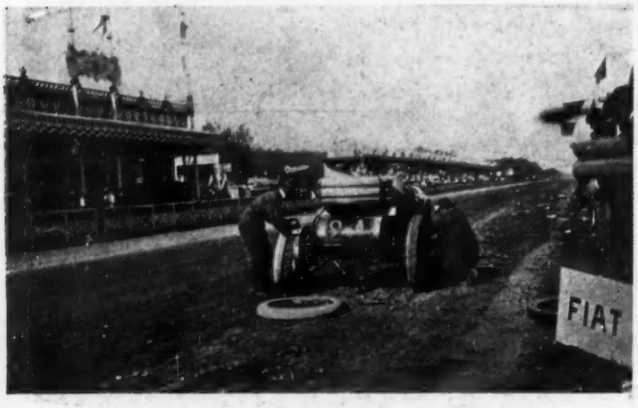
CLEMENT ON THE SPECIALLY CONSTRUCTED SCALES.



DeCATERS, ITALA; HENRI FOURNIER ALONGSIDE THE CAR.



ROUGIER, DeDIETRICH; HOW GASOLINE TANKS WERE FILLED.



LANCIA CHANGING TIRES OF THE PATENT RIM KIND.

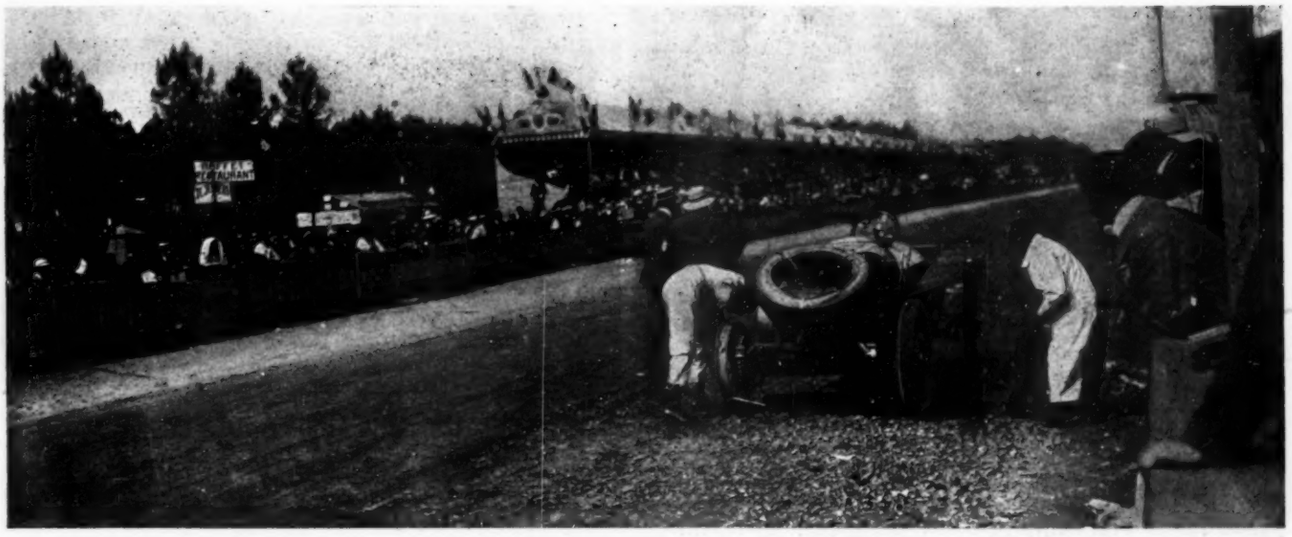
morning to witness the Grand Prix. The atmosphere of a race turns the head of most chauffeurs the world over, and on going to the course the owner of a wheezy single cylinder endeavors to imitate the racing man as much as does the lordly possessor of a 60-horsepower Mercedes or Panhard. Arriving at the center of activity at the foot of La Belle Inutile, the cars big and little are hustled into the large, sandy, heather-covered enclosure which serves as an open-air garage. It is surprising how much beauty can be hidden away under the most hideous automobile garb and how quickly the unshapely bundle of cloth rolling about in the tonneau or reclining in the corner of a limousine can be transformed into a creation worthy of the President's day at Longchamps, or the afternoon stroll in the Bois de Boulogne.

Promptly at five o'clock access to the course was cut off, and half an hour later the road in front of the stands was clear except for a busy body of much bebadged officials and still busier individuals with black mounted boxes who appeared to be on a continuous track for game. Five forty-five, and even the newspaper men have been unceremoniously hustled off the track by the now all-important gendarmes, while the black box fraternity, having no shelter of refuge, climb to the top of the barrier, hold on with one hand and ply their instrument with the other.

Racing Monsters Enter Upon the Scene.

A few minutes later and, as if the matter was a well-rehearsed play, the radiator of an automobile was seen peeping out of the enclosure opposing the stand, and close by the side of the timer's box. Gabriel's big De Dietrich came slowly round the corner, being dragged over the heavy sand by blue-jacketed mechanics. With quick movement the two men allowed on the course to crank each car got the engine running, the timer counted off the seconds, and Gabriel shot over the line and rushed down the road, leaving behind him a cloud of dust and smoke. In the meantime Lancia had come out with his Fiat and had his engine running when the first man left. An interval of only 90 seconds existed between the start of each car, and there was consequently no time for wasting words. It was noted with interest that Lancia's car was fitted with patent dismountable rim, and the three spare tires which he carried in the rear were already inflated and mounted on their rims. Lancia went off in good style and Szisz claimed the attention of the public. The Renault was also fitted with patent rims and the car in outward appearance differed entirely from last year's racer. The type of radiator and bonnet used on the flyer was similar to those used on the touring cars, except that the side and front of the bonnet had been cut out and filled with wire gauze. This did not add to its beauty, and as the low-built car shook and trembled under the throb of the powerful motor unfavorable comment was made by the onlookers. Szisz adjusted his goggles, placed a reserve pair on his head and shot over the line immediately his start was given. Hemery, with his 4A, a beautifully finished little car, painted in light blue with black V-shaped radiator in front, engine exposed showing nickeled and highly polished feed pipes and exhausts, spare tires well strapped on behind, compressed air chambers hung on the side frame and an engine that ran without the least vibration, received a cheer from the French section of the crowd as he went over the line. He responded with a military salute and the mechanic gave a wave of the hand.

The first Brasier car, driven by Baras and bearing the number 5A, was carefully examined by M. Brasier, who walked all round the machine, feeling a part here and there, lifted up the bonnet and looked at the engine and gave final instructions to his driver. As soon as the Brasier had gone the first Mercedes racer, number 6A, with Jenatzy at the wheel, took its place. Driver and mechanic were dressed in white and the car was painted in the same color. As mud guards the German champion had wide bands of brown canvas which



JENATZY HAD THE OLD STYLE, BUT IN THE VANDERBILT WILL NOT BE SIMILARLY HANDICAPPED.

hung down loosely on the front wheels but were stretched out tight when the engine had been cranked. The spare shoes carried behind were enclosed in brown covers. An official placed a large card under Jenatzy's nose, as indeed he had done to every driver, and appeared to impress on him the necessity of reading it carefully. It was a notification that all drivers must obey the signals of the committee men, a blue flag for caution and a yellow flag for danger necessitating a stop. Jenatzy made a start worthy of his reputation and gave the officials a cloud of dust from the loose sand on the side of the road.

Nazzaro, the driver of the big 2B Fiat, was wearing a red jersey which easily distinguished him from his companions. The entire Italian team was looked upon as formidable, and the start of all six cars was watched with keen interest, the presence of patent rims on the Fiat car, giving them an additional advantage in the eyes of the public. Immediately on the signal being given the Fiat car crossed over the line and stopped dead five yards beyond it. Nazzaro bit his fingers in rage while his mechanic jumped down and recranked the engine, the two men allowed on the course for cranking being forbidden to touch a car after the start had been given. A few seconds later the Fiat was rushing down the road.

When the big Hotchkiss, carrying number 12C, was brought out the first car was expected round and Shepard, the long-legged American, was given a start close to the railings in order to leave the road free.

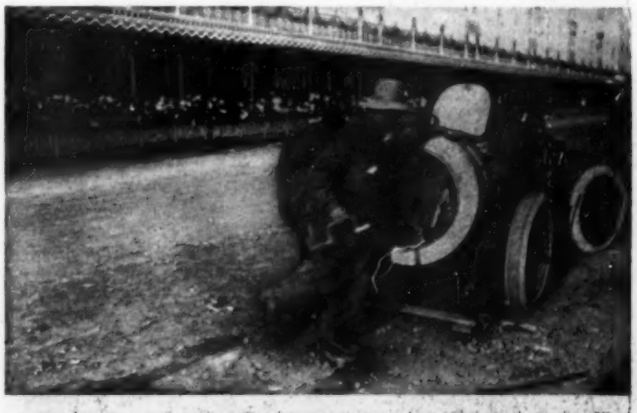
Finally, at 6:45 1-2 the last car, No. 13C, a Bayard-Clément, driven by De la Toutoutere, passed over the line, carrying with it four spare inflated tires on the rear platform. De la Toutoutere is but the racing name of Captain Gentilly, a popular French artillery officer, who has been nicknamed "Tant que ça peut"—the free translation of which is, "As hard as you can"—and the crowd sent a little cheer down the road after him and looked up the long hill to the right in expectation of the first car.

The First Round of the Circuit.

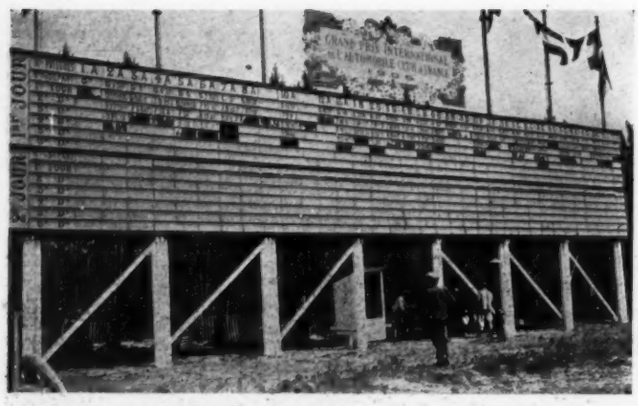
The spectators were not kept waiting long, and only a few minutes after the Clément car had gone a cry from a hundred lips, followed immediately by the bugle call, announced that a car was coming down the long slope of the Belle Mutile. Instead of Gabriel, who was expected, it was Lancia on a Fiat, who first finished the round, followed slowly by Szisz on Renault, Hemery on his Darracq and Baras on the Brasier. Gabriel, who had been expected to make extraordinary time, failed to turn up, and it was reported afterwards that he had broken a distance rod and was unable to continue. Szisz, starting third, had gained fifty seconds on Lancia in this round, and Baras, the fifth starter, had gained even more, his time for the round being 52:19—representing a speed of 75 miles an hour. M. Brasier was not pleased with the record-breaking performance, and muttered when the time was made known, "The scoundrel is going too fast." A succession of cars followed, some of them stopping at the depots for tires, oil and gasoline, others rushing straight on, and when it was possible to work out the times it was found that Baras had the first place, followed by Duray, Szisz, Weillochott, Pierry, Lancia, Hemery, Teste, Albert Clément, Heath, Wagner, Barillier, Edmond, Nazarro, Rigolly and Rougier, all of whom covered the round within the hour.

How the Men Changed Tires and Filled the Tanks.

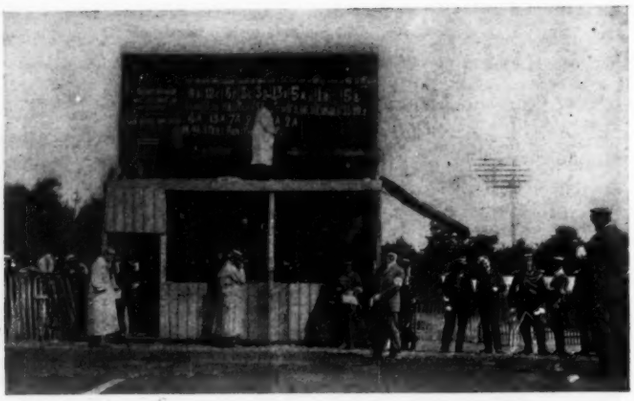
The most interesting feature of the morning's events was the changing of tires and filling of tanks at the depots opposite the grandstands. When it was seen that a car was going to stop the men on the stand to which it belonged would wave a hat or a flag to indicate the exact spot to the driver. Before the car stopped the mechanic had made signs to show whether he needed tires, water, gasoline, oil, etc. Before the machine had actually come to a standstill some of the mechanics had jumped to the ground, seized the double jack which was handed over and a second later the car was clear of the ground and the man at work on the tires. While this was being done the driver would take the gasoline and water pipes and place them in their respective tanks, and while they were filling would give his attention either to the engine



SZISZ HAD THE NEW KIND, BUT USED AN AMERICAN TOOL TO TIGHTEN THE BOLTS.



MAMMOTH SCORE BOARD WHICH TOLD ONLY CLOCK TIME.



THE SMALLER BOARD OF THE TIMERS, CRUDELY MARKED.

or the tires. The liveliest interest was displayed by the public in the changing of tires by the ordinary method and with the patent rims. Frequently two cars would come in together, one with ordinary and the other with mobile rims, and a comparison of the times in each car was made by the spectators. The Renault cars had mobile rims on the rear wheels and fixed rims on the front wheels, and every two rounds changed the latter, whether burst or not. On one occasion two rear tires were changed, tanks filled and the lubricator adjusted in 4 1-2 minutes. The change of a single front tire never occupied less than seven minutes.

Szisz Forges to the Front and Stays There.

Of the thirty-two starters nine were entirely out of the running when the third round finished, and it was then seen that Szisz with the 3A Renault had a decided lead, followed by Albert Clément, Nazzaro on the Fiat, Shepard on the Hotchkiss, Duray on the Dietrich, Baras and Barillier of the Brasier team, Richez on the Renault, Heath and Tart on Panhard machines and Florio on the Mercedes. Jenatzy was still well placed on the scoring board, but Mariaux had fallen low through loss of time on the second round.

Before eleven o'clock Szisz ran away on his last round and, barring accidents, there was no doubt as to the first day's winner. Albert Clément was the nearest to him, but was still too far off to seriously menace the Renault driver's position. With the possibility of the early arrival of the winner interest in the event began to revive and the grandstands filled again. Down the hill rushed the red Renault, past the yellow flag, waved to indicate the termination of the course, and flew along to the clearing, a mile further down, made for the cars to turn in, and a few minutes later was back before the stand with a committee man on board and was taken to the garage reserved for it. The arrival of Albert Clément second created more enthusiasm than the coming in of the winner, for the young driver was a general favorite, while the Renault car had not been looked upon as the most important. When Nazzaro had conquered third position all interest in the race vanished, for though the Brasier, the Panhard and Mr. Shepard's Hotchkiss were all running well, it was still impossible to foretell their final position; as to the rest, they could not be expected to arrive until late in the afternoon.

M. VINET, INVENTOR OF THE DETACHABLE RIM.

FEATURES OF THE SECOND DAY.

It had been thought that, owing to the method of starting, there would be less interest in the second day's race than was shown in the previous day's event. Such was not the case, the weeding out of half the cars and the improvement of the timing board doing much to simplify the race, and make it interesting to spectators. As they finished the first race the machines had been placed in the boxes reserved for them at the garage and carefully guarded all night. In the morning the cars were pulled to the course by a horse and given a start at the same spot as on the previous day. Szisz, who had finished first in 5:45:30 2-5, was supposed by many to have been sent away at the same hour in the morning. In reality he was started at 6 o'clock, the others being started with the interval of time between them and the winner when the first day's run was finished. Thus Albert Clément, who was 26:10 1-5 behind Szisz, was started at 6:26:10 1-5, and the others in like manner. The scoring board gave the total elapsed time for each man and allowed the relative positions to be seen at a glance. It was a system which ought to have been adopted on the first day.

Promptly at 6 o'clock Szisz, who had been walking round his machine eying it intently for several minutes, was given the order to start. He jumped into his seat, the mechanic cranked the motor, which started at the first turn, and the three went over the line and stopped at the depot. In a twinkling the two men were on the ground again, the mechanic jacked up the front right wheel while Szisz went to work on the lubricator. A minute later he had taken a double jack, raised up the two rear wheels of the car and began to change the back tires. The eight screws forming a part of the mobile rim were taken off with lightning rapidity and before the mechanic had finished on the front tire, which had an ordinary rim, Szisz was working at the second rear tire. The mechanic now came to the rear and both men worked on the same wheel. The rear platform was straightened out and three new tires strapped on. Gasoline and water tanks had been filling while this work was going on, and in exactly 10 1-2 minutes from the time the start was given three tires had been changed, all tanks filled, lubricator regulated, the engine cranked and the car off again on its journey. No part of the race was witnessed

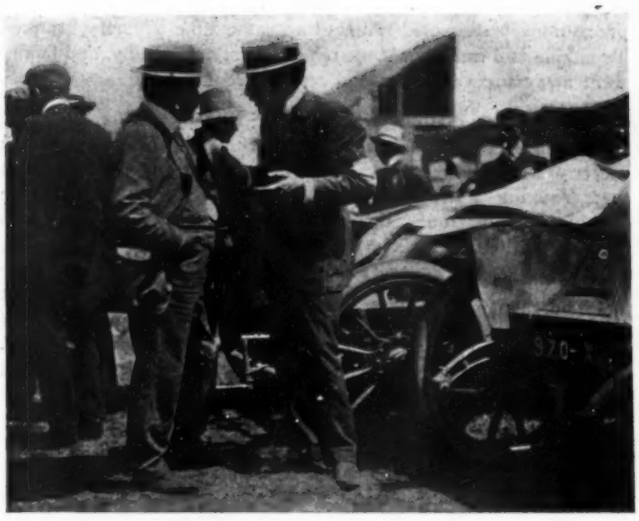
with more interest than this event, and admiration for the new method of changing tires was unbounded.

How Clêment, Nazzaro, Shepard and Others Got Away.

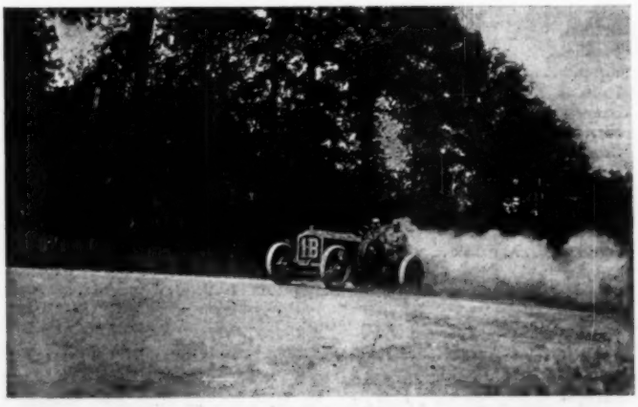
Szisz had only just gone when Albert Clément's car was dragged to the starting line, the young driver, his mechanic, Venus and M. Clément senior walking round the machine, evidently discussing what should be done at the start. On the word "Go!" Albert leaped into his seat and diminutive Venus grabbed the handle. Three or four turns were given, but the motor refused to respond. "Start on the accumulator!" yelled Clément, now as excited as he was cool a few minutes before. A roar of the exhaust followed, the car went over the line and stopped at the depot a few yards down. Four inflated tires were put on the rear platform by the young driver himself, who used both his hands and his head in the lifting of them; they were strapped up and the little Frenchman jumped on to the top of the car to look at the tanks. Evidently the gasoline was not flowing fast enough through the feed pipe, for he shouted for cans to be handed to him. This was done and the contents of several three-gallon cans with big mouths emptied into the tank. A quantity was spilled over the car and the empty tins were flung to the ground with an impetuosity that revealed a determination to win or die. Two compressed air tanks were taken on board and the car was restarted.

Nazzaro, of the Fiat team, still dressed in his red jersey, started his motor on the first turn of the handle and went away without stopping at the depot. As there was but an interval of fourteen minutes between the Italian's and the Frenchman's start, and the latter had lost about eleven minutes in cranking and filling up at the depot, he was close pressed by his rival on the first round. Fitz Shepard, who was smoking a cigarette when his start was given, had the left rear tire of his Hotchkiss burst and had to stop to change at the depot. Barillier, who started 63 seconds later, had a slack chain and had to stop to tighten it, while his mechanic crawled under the machine to effect some repairs. Richez was not in running condition either and pulled up at the Renault station for repairs. Heath came out next and was kept well to the roadside to allow Szisz to pass, for his arrival was expected at any moment. Heath indeed had just started his motor when the Renault rushed by at a terrible speed and a second later had disappeared from view. Tire troubles caused the American to stop at the depot, and there was the interesting sight of four cars laid up by the roadside for repairs. Heath appeared to become very nervous while at work, and savagely bit a twig which he had been carrying in his mouth. He was, however, the first to get away, followed 30 seconds later by his countryman, Shepard. Teste and Richez were now by the roadside, the latter working at a front tire, and the former, after some attention to his tires, started away as Lancia was given the order to go. The Fiat had just gone over the line when the motor stalled, and Lancia's mechanic had to run round to the front to recrank. At the first turn of the handle the motor restarted, but Lancia was too excited and in too big a hurry to allow his man time to regain his seat, and to avoid being run over he seized hold of the top of the radiator and was carried down to the repair depot in this position. While Lancia was changing his tires Albert Clément rushed past without stopping, having finished his seventh round. Hemery's brilliant little Darracq could not be started, and had to be pushed down the road to the depot, where extensive repairs were commenced on the valves. Rigoly came out and went off with his Gobron whilst Hemery was still at work. Mariaux started his Mercedes and flew away without a stop. Baras, whose tires were in good condition, took fuel and went away immediately. Barillier (Brasier) and Richez (Renault) each finished a round, Duray (De Dietrich), Pierry (Brasier), Burton (Mercedes), replacing Jenatzy, and Rougier (De Dietrich) were all started, and still Hemery worked at his motor in a despairing manner.

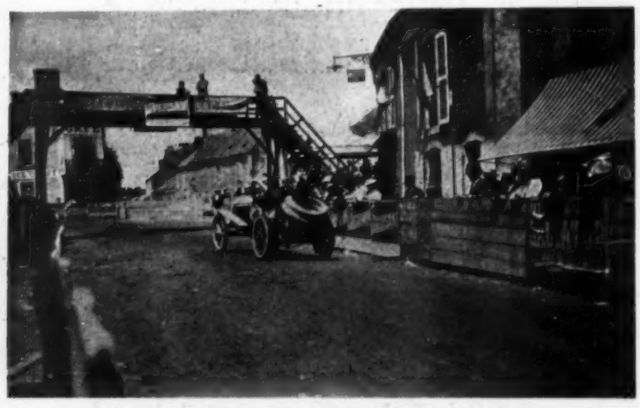
The passage of cars became frequent while the last three were being sent away, and the interest of the spectators was fully maintained from 6 to 8.30 A. M. in the repairing operations and arrival of the first starters. About nine o'clock a telegram was received by M. René de Knyff, of the Panhard firm, announcing an accident to Teste. After going round the bend at La Fourche the fork of one of the front wheels snapped, both wheels came off and the front of the car dug into the ground. Both men were thrown out, Teste sustaining a broken thigh; his hand also was laid bare to the bone, and he complained of internal pains. From the commencement there had been little doubt of Szisz winning the race, and when, a little after nine o'clock he finished his ninth round, still well ahead of all competitors, he was freely spoken of as the winner. Before starting on his tenth round Szisz filled up with gasoline and water and changed his two rear tires as a



MM. BRASIER AND RENAULT TALKING IT OVER.



ROUGIER RAISED THE DUST PASSING THROUGH CONNERE.



HEATH PASSING THROUGH CONNERE.—BRIDGES OVER STREETS.

precautionary measure. About the same time Hemery cranked his engine and ran it for some ten minutes, firing badly, and finally went away for his first round on the second day.

A Brilliant Race for Second Place.

With Szisz's position practically secure, the attention of the spectators was directed toward Albert Clément and Nazzaro, who were running a neck-and-neck race round the course. At the end of the ninth round the young Frenchman had a lead, of 16 minutes on the Italian. On the tenth round the difference between the two had been reduced to one minute. Albert Clément, however, had to stop to take gasoline and oil on board, load up with tires and change the compressed air tanks. In his excitement he rushed past the station and had to come back on reverse gear. The feed pipe was too slow for filling the gasoline tank, and Albert ordered the big cans to be handed up to him, and emptied their contents into the tank in such a reckless manner that the car was in serious danger of catching fire. Never was a car loaded up so quickly; the young driver appeared to be endowed with the strength of a lion and the agility of a monkey, and in an incredibly short space of time he was rushing wildly down the road with Nazzaro in hot pursuit a mile in the rear. On the eleventh round Nazzaro gained about a minute and a half, placing himself thirty-two seconds ahead of Clément. Intense excitement prevailed as the two cars went away for the last round, which was to decide which of them should secure second place. All the morning the sport had been keen and fast. Heath, who was doing fast time, had pulled up at the station in a terribly excited condition, took two new tires behind, gave one to his mechanic to hold between his legs, and went away quickly. He had evidently seen and brought in news of the accident to Teste.

At the end of the tenth round Nazzaro came in with his left rear tire burst, and had to change at the depot. Clément passed while he was there and signaled that he had punctured, but rushed through without stopping. Mariaux had lost a shoe while coming down the hill toward the grandstand, and when he pulled up at the stand had so injured his rim that he was for some time unable to start. The Brasier team, too, signaled that they had suffered from punctures.

Szisz Wins Easily with a Strong Lead.

Soon after twelve o'clock all were on the lookout for Szisz on his last round, and though it was noon, and only a trifle cooler than on the previous day, none thought of food or shade in their eagerness to greet the winner. Lancia had just gone by on his tenth round at a furious pace, when a cry of "He is coming!" followed immediately by a bugle call, announced the arrival of the winner. Two minutes later Szisz came tearing along and whizzed down the road to the turning point provided a couple of miles away. When he came back he was carried in triumph to the grandstands and presented to the Minister of Public Works, who publicly congratulated him on his performance. Compared with some demonstrations on similar occasions, the greeting was, on the whole, of a rather sober nature.

Nazzaro Wrests Second Place from Clément.

After Szisz had been carried to the firm's headquarters shoulder high the arrival of the second and third men was looked for. Nazzaro had a slight advantage at the beginning of the last round, but Albert Clément was the favorite, and all faces were turned towards La Belle Inutile in the hope of seeing him arrive first. Down the hill tore the red-jersied Nazzaro, and before he was well out of sight Clément thundered after him, having lost second place by a little more than three minutes. For six rounds the two young men had run neck-and-neck, and the finish was one of the most exciting ever seen in a motor race. Nazzaro and his mechanic were presented to the Minister, and when Albert Clément came back to the grandstand he, too, was officially presented and publicly congratulated.

DETAILS OF CONSTRUCTION OF THE THIRTY-FOUR GRAND PRIX RACERS.

Make and Nos. of Cars	Cylinders	Bore, M.M.	Stroke, M.M.	R.P.M..	H.P.	Circulation	Carbureter	Clutch	Drive	W'ght, Kilos	Track, Meters	Wheel base Meters	Tires	Wheels
Lorraine Dietrich, 1A, 1B, 1C	4 vertical, in pairs	185	160	1,100	130	centrifugal pump	Dietrich, perpendicular currents	cone clutch	chain	999	1.40	2.95	Michelin and Continental	wood
Fiat, 2A, 2B, 2C	4 vertical, in pairs	180	160	1,300	116	centrifugal pump	Fiat, perpendicular currents	spiral springs	chain	1,006	1.35	2.85	Michelin	wood pat. rims
Renault, 3A, 3B, 3C	4 vertical, in pairs	165	150	1,200	105	thermo-siphon	Renault, parallel currents	cone	shaft	1,006	1.35	2.90	Michelin	wood pat. rims
Darracq, 4A, 4B, 4C	4 vertical, in pairs	180	150	1,200	125	centrifugal pump	Darracq, parallel currents	cone	shaft	1,004	1.35	2.85	Dunlop	wire,
Brasier, 5A, 5B, 5C	4 vertical, in pairs	165	140	1,380	110	centrifugal pump	Brasier, convergent currents	cone locking device	chain	1,007	1.35	2.75	Continental	wood
Mercedes, 6A, 6B, 6C	4 vertical, in pairs	175	150	1,300	125	centrifugal pump	Mercedes, perpendicular currents	Lindsay spiral springs	chain	1,007	1.36	2.92	Continental	wood
Gobron Brillié, 7A	4 vertical, 8 pistons	140	220	1,200	110	centrifugal pump	Gobron, parallel currents	Herisson	Chain	1,003	1.40	3.00	Gaulois	wood
Itala, 8A, 8B, 8C	4 vertical, in pairs	180	145	1,200	110	centrifugal pump	Itala, convergent currents	Hele-Shaw disk	shaft	1,006	1.40	2.95	Michelin	wood
Gregoire, 9A, 9B	4 vertical, in pairs	140	130	1,200	90	thermo-siphon	Gregoire, perpendicular currents	cone	shaft	750	1.25	2.25	Continental	wood
Panhard-Levassor, 10A, 10B, 10C	4 vertical, steel copper jack'ts	185	170	1,100	130	centrifugal pump	Krebs, hydraulic regulator	Hele-Shaw disk	shaft	1,007	1.40	2.85	Michelin	wood
Vulpes, 11A	4 vertical, in pairs	180	160	1,100	120	centrifugal pump	Vulpes, parallel currents	Hele-Shaw disk	chain	1,000	1.44	2.80	Dunlop	wood
Hotchkiss, 12A, 12B, 12C	4 vertical, in pairs	180	160	1,150	125	centrifugal pump	Hotchkiss, 2 sprayers, perpendicular cur.	cone	shaft	1,003	1.45	2.65	Michelin	wire
Bayard-Clement, 13A, 13B, 13C	4 vertical, steel	160	160	1,350	125	centrifugal pump	Bayard, parallel currents	Hele-Shaw disk	shaft	1,004	1.35	2.90	Dunlop	wood pat. rims

TIMES AND ORDER OF FINISH OF EACH DRIVER IN THE GRAND PRIX RACE IN FRANCE, JUNE 26 AND 27, 1906.

Showing running times for each round and elapsed times progressively for each car.

First Day, June 26. | Second Day, June 27

No.	Country	Car	Driver	Start, Clock Time	1st Round	2d Round	3d Round	4th Round	5th Round	6th Round	Position	No.	7th Round	8th Round	9th Round	10th Round	11th Round	12th Round	Final Position
1a	France	Dietrich	Gabriel	6:00:00	Distance rod broken, retired first round.							1a							
2a	Italy	Fiat	Lancia	6:01:30	0:53:42	1:34:20 2:28:2	0:55:58 3:24:00	1:26:20 4:50:20	1:00:28 5:50:48	1:21:21 7:12:09	9th	2a	1:12:20 8:24:29	1:08:38 9:33:07	1:29:00 11:02:07	1:04:01 12:06:09	1:09:49 13:15:58	1:06:12 14:22:11	5th
3a	France	Renault	Szisz	6:03:00	0:53:03	0:57:14 1:50:17	0:57:34 2:47:51	0:56:13 3:44:04	0:57:21 4:41:25	1: 4: 5 5:45:30	1st	3a	1:02:15 6:47:45	1:02:43 7:50:28	0:57:46 8:48:14	1:07:55 9:56:09	1:11:52 11:02:14	1:11:52 12:14:07	1st
4a	France	Darracq	Hémery	6:04:30	0:55:55	0:55:39 1:51:34	1:46:35 3:38: 9	1:18:23 4:57:32	1:17:27 6:14:59	1:11:19 7:26:18	10th	4a	5:54:31 13:20:50	Repaired valves, magneto, etc., by roadside and abandoned on eighth round.					
5a	France	Brasier	Baras	6:06:00	0:52:19	0:52:41 1:45:00	1:09:56 2:54:56	1:03:57 3:58:53	2:12:26 6:11:19	1:30:24 7:41:43	13th	5a	1:35:57 9:17:40	1:22:45 10:40:25	0:57:41 11:38: 7	1:25:28 13:01:35	1:10:27: 14:13:02	1:02:47 15:15:50	7th
6a	Germany	Mercedes	*Jenatzy	6:07:30	1:15:46	0:55:23 2:11:09	:57:36 3:08:45	2:10:10 5:18:55	1:32:37 6:51:32	1:15:48 8:07:20	16th	6a	1:18:57 9:26:17	1:23:54 10:50:11	1:12:56 12:03:08	1:11:34 13:14:42	1:29:39 14:44:22	1:24:20 16:18:42	10th
7a	France	Gobron	Rigoly	6:09:00	0:59:15	1:02:50 2:02:05	1:09:24 3:11:29	1:33:09 4:44:38	1:45:17 6:29:55	1:06:13 7:36:08	11th	7a	2:35:19 10:11:27	Leaking radiator.					
8a	Italy	Itala	Cagno	6:10:30	1:23:22	2:26:23 3:46:45	Water pipe broke, motor heated, and when water was added a cylinder cracked.					8a							
9a	France	Gregoire	Taverneaux		Did not start.							9a							
10a	France	Panhard	Heath	6:13:30	0:55:39	1:07:16 2:02:55	1:08:21 3:11:16	0:57:23 4:08:39	1:13:58 5:22:37	1:25:35 6:48:12	7th	10a	1:12:05 8:00:17	1:09:54 9:10:11	1:25:42 10:35:54	1:30:06 12: 4:01	1:19:26 13:23:27	1:24:18 14:47:45	6th
11a	France	Vulpes	Barriaux		Did not start.							11a							
12a	France	Hotchkiss	Le Blon	6:16:30	4:19:23	1:02:27 5:21:50	1:13:37 6:35:27	1:04:33 7:40:00	Broke wheel first round; repaired, but broke again on fifth.			12a							
13a	France	Bayard-Clement	A. Clement	6:18:00	0:56:31	0:57:00 1:53:31	1:08:09 3:01:40	1:00:21 4:02:01	1:06:01 5:08:02	1:03:38 6:11:40	2d	13a	1:03:05 7:14:45	0:54:27 8:09:13	1:18:35 9:27:49	1:13:45: 10:41:34	1:07:32 11:49:07	1:00:39 12:49:46	3d
1b	France	Dietrich	Rougier	6:19:30	0:59:25	1:42:58 2:42:23	1:19:24 4:01:47	1:04: 3 5:05:50	1:53:58 6:59:48	1:16:07 8:9:55	17th	1b	1:14:46 9:50:41	1:59:20 11:02:11	0:53:16 11:55:18	2:43:48 14:39:07	Tire troubles.		
2b	Italy	Fiat	Nazzaro	6:21:00	0:57:07	1:02:53 2:01:00	1:02:00 2:03:00	0:55:58 3:58:58	1:18:22 5:17:20	1:09:33 6:26:53	3d	2b	1:02:19 7:28:42	1:06:02 8:34:45	1:08:39 9:43:24	0:56:46 10:40:11	1:08:24 11:48:35	0:57:51 12:46:26	2nd
3b	France	Renault	Edmond	6:22:30	0:57:32	1:04:28 2:02:10	1:14:33 3:16:43	1:23:25 4:40: 8	2:27:54 7:08:02	Goggles broke; round.		3b	eyes injured, left car and went to hospital, restarted but retired on sixth						
4b	France	Darracq	Wagner	6:24:00	0:56:43	0:57:09 1:53:52	Lubricator feed pipe broke.					4b							
5b	France	Brasier	Barillier	6:25:30	0:56:55	0:56:14 1:52:59	0:53:23 2:48:22	1:45:21 4:33:43	0:59:26 5:33:09	0:58:39 6:31:48	5th	5b	1:23:48 7:55:36	1:22:46 9:18:23	1:06:29 10:24:52	1:18:37 11:43:30	1:04:08 12:47:38	1:05:21 13:53:00	4th
6b	Germany	Mercedes	Mariaux	6:27:00	1:02:12	1:17:00 2:19:02	1:49:32 4: 8:34	1:01:26 5:10:00	1:02:40 6:12:40	1:26:51 7:39:31	12th	6b	0:50:38 8:39: 9	1:07:42 9:46:52	1:20:24 11:07:16	2:30:07 13:37:24	1:50:03 15:27:27	1:11:14 16:38:41	11th
8b	Italy	Itala	Fabry	6:28:30	Car overturned on bend.							8b							
9b	France	Gregoire	Civelli de Bosch	6:30:00	Radiator trouble, retired first round.							9b							
10b	France	Panhard	Tart	6:31:30	1:04:06	1:03:33 2:07:39	0:58:31 3:06:10	0:55:28 4:01:38	Broken chassis.			10b							
12b	France	Hotchkiss	Salleron	6:33:00	1:43:46	1:19:17 3:03:08	Broke wire wheel and retired. 1:20:32 Tire burst, rim damaged.					12b 13b							
13b	France	Bayard-Clement	Villemain	6:34:30	2:17:30	2:46:50 5:05:20	6:25:52 1:12:35	1:39:29	0:52:41	2:04:24	14th	1c	1:28:58 9:27:46	1:00:59 10:28:45	1:17:27 11:46:13	1:35:40 13:21:54	1:00:04 14:21 58	1:04:03 15:26:01	8th
1c	France	Dietrich	Duray	6:36:00	0:52:32	1:17:07	3:22:14	5:01:43	5:54:24	7:58:48									
2c	Italy	Fiat	Weillschott	6:37:30	0:53:40	2:09:39 0:53:08	1:31:56 3:18:44	0:56:52 4:15:36	0:54:50 5:10:26	Overturned.		2c							
3c	France	Renault	Richez	6:39:00	1:02:16	1:46:48 1:06:35 2:08:51	1:10:41 3:19:32	1: 1:49 4:21:21	1:16:35 5:37:56	0:57:51 6:35:47	6th	3c 4c	1:28:51 8:04:38	0:57:57 9: 2:36	Car overturned.				
4c	France	Darracq	Hanriot	6:40:30	Cracked cylinder.		2:14:35	1:17:17	1:28:02	1:12:42	15th	5c	1:20:26 9:19:31	0:57:21 10:16:52	1:10:46 11:27:39	2:03:12 13:30:51	1:24:05 14:54:56	1:20:10 16:15: 7	9th
5c	France	Brasier	Pierry	6:42:00	0:53:58	0:52:31	4:01:04	5:18:21	6:46:23	7:59:05									
6c	Germany	Mercedes	Florio	6:43:30	1:05:15	1:46:29 0 58:35 2:03:50	1:08:44 3:12:34	1:46:47 4:59:21	1:07:04 6:06:25	Tire troubles; damaged rim.		6c							
8c	Italy	Itala	Caters	6:45:00	1:59:09	Tire burst and rim was ruined.						8c							
10c	France	Panhard	Teste	6:46:30	0:56:15	0:55:49 1:52:04	1:05:31 2:57:35	0:57:09 3:56:44	1:52:23 5:47: 7	1:14:45 7:01:52	9th	10c	Fork of one front wheel broke, wheel came off, men injured.						
12c	France	Hotchkiss	Shepard	6:48:00	1:02:12	0:56:33 1:58:45	1:01:02 2:59:47	0:54:31 3:56:18	1:20:25 5:16:43	1:14:02 6:30:45	4th	12c	1:42:37 8:13:22	Wire wheels broke.					
13c	France	Bayard-Clement	De la Touloubre	6:49:30	1:22:49	1:52:36 3:15:25	Gear box worked loose; magneto troubles.					13c							

*Burton replaced Jenatzy on the second day.

GRAND PRIX IMPRESSIONS OF TWO AMERICANS

By A. G. BATCHELDER.

PARIS, July 4.—The Grand Prix of the Automobile Club of France was the most stupendous contest ever projected in automobiling. Conceived and carried out on such an elaborate scale that a profitable showing of the ledger became impossible, the whole effort betrayed the very evident idea of the French organization to outdo all previous races, and at the same time prove to the world that France still contains the bulk of what is encompassed in the automobile industry.

If one now were to canvass the membership of the French club, he would discover that the Grand Prix has not been an entirely satisfactory substitute for the "Coup Internationale," as its donor, James Gordon Bennett, prefers to call it in his own Paris *Herald*. The Grand Prix, it must be kept in mind, was instituted because the French makers, who form in one way or another the majority of the Sporting Commission of the Automobile Club of France, did not care to risk their substantial foreign sales in any more team cup races wherein all countries had a like limited number of entries.

No Incentive for Foreigners to Win Grand Prix.

True it was in the Grand Prix that any maker could have three cars, no matter in what country he did his manufacturing, but an outsider had to bring them and every part of them to France. Then, even if he won, the next contest would be held in France, and again he would have to accept the huge handicap of not having his home plant in convenient reach.

Of course, the international phase of the Grand Prix was minor in character. Italy responded with six entries because France had lent some support—not as much as anticipated—in the two Italian spring events. Germany with three cars really figured only through the Paris agent of its leading concern. France has been the leading factor in automobile construction, is entitled to vast credit for its achievements in this direction and naturally desires to retain its prestige. Recognizing that racing is still a necessity, France can hardly be blamed for trying to have it carried on in a manner in which the hazard of injury by losing will be reduced appreciably.

THE AMERICAN AND FRENCH RACING CHAIRMEN.

Chairman Jefferson de Mont Thompson of the Vanderbilt Cup Commission and A. A. A. Racing Board on the left. Chairman Rene de Knyff of the Sporting Commission of the Automobile Club of France on the right. A. G. Batchelder, member of Vanderbilt Cup Commission and A. A. A. Racing Board, in the center.

Why the Coup Internationale May Be Revived.

But the other countries—several of which are now challenging the attitude of France in classing itself alone—have the privilege of declining to race France in its own way and under its own rules. And the whole of France does not take the same interest in a race four-fifths French. Therefore, one may see a revival of the Coup Internationale forced upon France, and even its makers may advise such a proceeding. If the countries which in the past have figured in the cup race would agree to support the Grand Prix, the Automobile Club of France would agree to a prompt resumption of the struggle for Mr. Bennett's trophy. But this giving to France as the price of its participation in the Coup Internationale another race in which it will have more chances than the other countries, is a sum not likely to be paid by the United States and Great Britain. A lesser representation for the smaller countries in the Coup Internationale, is the only solution likely to satisfy those who now look upon the Grand Prix as an impossible idea of international competition.

Chairman Thompson and I were in an observing frame of mind, and, in the main, our views of the Grand Prix were not dissimilar. We were alert for any ideas that could be adopted entirely for the Vanderbilt Cup race, as well as for things that could be used in modified form. Upon the chairman's return he will suggest to the Vanderbilt Cup Commission a summing up of what he believes available for the American event.

Defects of the Grand Prix Were Marked.

But the Grand Prix had defects of magnitude, at least in our humble American opinion. The tarring of the course was a failure; the grandstand would have served better as a hot-house for early vegetables than as a vantage place for human beings from which to see a race; the marking of the cars by a combination scheme of numeral and letter was confusing and bothersome; and two days for the contest was one day too much. The course was a mixture of good and bad road, very bad at times, and replete with stones that melted away tires like ice in a summer sun. The detachable rim of Michelin figured largely in the victory of Szisz; without it the Renault's battle would have been more difficult.

Model Policing of the Circuit.

The policing of the circuit could hardly have been improved upon—over 7,000 soldiers and miles of fences; every crossroad blocked, every path even had the picket network and a soldier; in the villages people used bridges over the streets; and the A. C. F. paid the Government for the use of its soldiers.

The automobile industry of France owes much to the support given by the Government in many directions, and the French people have taken a pardonable pride in the automobile advancement of their country, which has been substantial from the outset.

Why can't the United States Government loan for a couple of days enough soldiers to guard a 30-mile circuit for the Vanderbilt Cup race? The race is a free spectacular contest —the greatest of the age—and the general public wants to see it. Furthermore, the industrial complexion of the struggle should appeal to Roosevelt, the man who frequently establishes a precedent.

CATECHISM OF THE GASOLINE AUTOMOBILE*—V

By FORREST R. JONES, M.E.

Q.—What is a differential?

A.—A device for allowing the driven wheels to rotate at different speeds and still receive the same amount of force to rotate (drive) them. (Same torque.)

Q.—Describe a differential.

A.—When the propeller shaft drive is used, the part of the rear axle which turns the road wheels is in two parts, each of which is connected to its own road wheel. The division is generally near the middle of the axle. Each half of the live axle has a gear attached rigidly to its inner end. Both gears are usually of the same form and size. Either bevel gears or spur gears are used. When bevel gears are used, two or more smaller bevel gears are interposed between those on the half axles. The axes of the interposed gears are perpendicular to the rear axle. The casing or part which supports the interposed gears is driven by the propeller shaft, and the power it receives is transmitted in equal portions to the two road wheels, whether the latter are rotating at the same speed when the car is traveling in a straight path, or at different speeds when rounding a curve. If the road wheels are lifted so as to turn freely, and one is turned forward, the other will turn backward at the same rate.

In a spur differential the action is exactly the same. The intermediate gears of the bevel gear differential are replaced by two spur gears, one of which engages with the spur gear on the inner end of the right hand half axle, and also with a gear of its own size and form which in turn engages with the spur gear on the inner end of the left hand half axle. Two or more pairs of these small intermediate gears are used.

Q.—What is the arrangement of the differential for a single chain drive?

A.—The differential is placed on the rear axle, as for the propeller shaft drive, and its action is the same as for the latter.

Q.—What is the arrangement of the side chain drive with a chain for each rear wheel?

A.—The rear axle is made solid and the differential is placed on an additional shaft extending across the length of the car in the rear of the change-speed transmission gears. Chains lead from sprocket wheels at the outer ends of the divided countershaft to sprockets on the rear wheels. The road wheels can thus rotate at different speeds and each always receives half of the power transmitted to both.

Brakes and Their Operation.

Q.—What is a band brake?

A.—A band (shoe) surrounding a smooth surface, generally cylindrical, and brought into action by tightening it to grip the part whose motion is to be resisted. The inner part is the brake drum.

Q.—What is an expansion brake?

A.—One in which an inner part (the shoe) is expanded to press against the inner surface, generally cylindrical, of the part whose motion is to be resisted.

Q.—How many brakes placed on the hubs of the rear wheels differ in their action from a brake placed between the differential and the engine?

A.—If the hub brakes are not properly adjusted, or, if one is oily and the other dry, they will not offer equal resistance to the rotation of the rear wheels, and consequently the car will swing to one side when they are applied. This is liable to cause skidding and turn the car across the direction of its travel on a slippery road. With the brake applied in front of the differential, however, equal resistance is offered to the rotation of both wheels.

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Q.—What is an equalizer as applied to brakes?

A.—Some device such as a bar, to which force is applied at the centers for putting on the brakes. The brake-shoe rods are fastened at each end of the bar. By this device each hub brake is tightened with equal force. Numerous other devices for obtaining the same result are used.

Q.—Will an equalizer bar apply hub brakes so as to offer equal resistance to the turning of the road wheels?

A.—Only when the rubbing surfaces of the brake and brake drum are in the same condition. If one is dry and the other oily the dry one will offer far greater resistance to turning.

Bearings—Plain, Ball and Roller.

Q.—What is a plain journal bearing?

A.—A cylindrical piece rotating in a cylindrical hole. A rotating shaft turning in a hole bored in a piece of metal is an example.

Q.—What is a journal box?

A.—The removable lining that is generally interposed between the journal and body of a machine. It is attached to the concave member.

Q.—What is a ball bearing?

A.—One in which balls are interposed between the rotating piece and the other member of the bearing.

Q.—What forms of grooves are used in ball bearings?

A.—Generally those whose cross section is an arc of a circle slightly larger in radius than that of the ball. From 4 per cent. to 10 per cent. larger.

Q.—Will a ball bearing withstand end thrust?

A.—Yes.

Q.—What is a cylindrical roller bearing?

A.—One having cylindrical rollers interposed between the rotating and stationary parts of the bearing, both of whose surfaces are also cylindrical. The rollers are either solid or made up of a ribbon of metal wound spirally to form a roller which is elastic and allows some change in its diameter.

Q.—What is a cone roller bearing?

A.—One in which conical rollers are interposed between the surfaces of the rotating and stationary parts, which are also both conical (tapered, cone-frusta).

Q.—Will a conical roller bearing resist end thrust?

A.—Yes, in one direction. A pair of such bearings is generally used with the small ends toward each other so as to resist thrust in either direction.

Q.—What is a ring-oiled bearing?

A.—One in which a thin, narrow ring hangs over the journal and dips into a small reservoir of oil below the bearing sleeve. The rotation of the journal causes the ring to rotate by friction against it when it rests on the journal. The lubricant is carried up by the ring and part of it is left on the journal.

Steering Gears.

Q.—What is the arrangement of the steering gear?

A.—Each front wheel is supported by a knuckle which is pivotally connected to the front axle at a point near the hub of the wheel. Sometimes the pivot is at the center of the hub. The knuckles have arms of equal length. The ends of the arms are connected by a distance rod which holds the wheels so that they are straight forward when in position for traveling a straight road, and causes them to swivel through proper angles for turning a curve. A second arm on one of the knuckles has a reach rod connected to it that is also attached to the mechanism at the lower end of the steering post. The latter is operated by the steering wheel. When the steering

wheel is rotated by hand the road wheels are turned either to the right or the left as desired.

Q.—What is the difference between a reversible and an irreversible steering gear?

A.—The reversible steering gear is one which allows the front road wheels to be turned about their swivels by a force applied to the wheels. In the irreversible gear this is not possible. Steering gears on small cars are generally reversible. In large cars they approach quite near to non-reversibility.

Q.—Are the angles through which the front wheels swivel from the position for straight ahead equal when they are put into position for rounding a curve?

A.—No. The wheel on the inside of the curve (curve of smaller radius) swivels through a greater angle than the outer one. This is necessary to bring the wheels in position to travel around the curve without a tendency to go in different directions. The wheels must swivel so that if the axes of the front wheels were extended toward the center of the curve they would intersect on an extension of the rear axle at the center of the curve.

Lubricators and Lubrication.

Q.—How is the engine lubricated?

A.—In the vertical type with the cylinder above the crankcase, lubricating oil is fed into the inclosed crankcase, generally dropping on the lower end of the connecting rod, whose rotation throws part of the oil up into the cylinder, thus lubricating it. Oil is also sometimes fed on the bearings which support the crankshaft. Part of the oil collects in the bottom of the crankcase and is splashed into the cylinder and over the other parts by the end of the connecting rod.

In a horizontal engine, oil is also generally fed in to lubricate the side of the piston at the top of the cylinder. The lubricator is generally located at some distance from the engine and connected to the oil holes by pipes.

Q.—What kind of lubricators are used for the engine?

A.—Gravity feed, compression (force) feed, and mechanical (positive) feed. In each the oil contained in a reservoir is fed out as required.

Q.—How is the rate of flow of oil adjusted in the gravity feed lubricator?

A.—By a needle valve or corresponding device for each pipe leading out to the different parts of the engine. By adjusting the needle to regulate the size of the orifice, the desired rate of flow is secured and maintained with fair accuracy as long as the temperature of the oil remains constant.

Q.—How does the compression (force-feed) lubricator operate?

A.—The oil is contained in a reservoir which has a pipe leading from near the top of the oil tank to the crank chamber of the engine or one of the exhaust pipes.

In engines of the two-cylinder exhaust type the pistons approach and recede from each other when in motion (they both move toward the crankcase at the same time). This action compresses the air in the crankcase every revolution and some is forced up through the tube to make air pressure above the oil. A check valve in the tube prevents the return of the air to the crank chamber when the pistons recede from each other. The pressure is thus constantly kept in the oil tank. The oil is fed through an opening starting at the bottom of the tank and leading to the various needle valve regulators for the pipes leading to the different parts of the engine. When the engine is not in use, no oil flows, but as soon as it is started the compression produced causes it to feed and continue as long as the engine is running. It will also continue some time after the engine is stopped if some means are not provided for relieving the pressure in the oil tank. The regulation of flow is as for the gravity system.

Q.—What is the mechanical system of lubricating?

A.—The oil reservoir contains pumps which are mechanically operated by power received from some moving part of the engine. The feed is regulated so that the desired quantity passes out through each pipe for each stroke of the individual pump connected to it. Each feed pipe has its own pump. The amount of oil fed is proportional to the speed of rotation of the engine, that is, so much per revolution or per hundred revolutions of the engine. In properly designed mechanical pumps the feed can be adjusted to the desired quantity, which will always be fed, whether the oil is thick or thin.

Materials for Gaskets.

Q.—What is a gasket?

A.—A piece of comparatively soft metal placed between two harder surfaces, generally metallic, for making a tight joint. The gasket is used in pipe couplings, on engine cylinder heads when they are separate from the cylinder, etc.

Q.—What material would you use for a gasket on an exhaust pipe?

A.—Something that is not affected by high temperature. Woven asbestos with copper net is most commonly used. Soft sheet copper, or copper asbestos gaskets made by placing asbestos between the copper parts.

Q.—For an inlet pipe gasket?

A.—Something not affected by gasoline. Wood fiber, leather, paper, soft copper, lead. Do not use rubber.

Q.—For a water circulating pipe gasket?

A.—Any good steam packing will answer, also leather and wood fiber. If oil is used to make a non-freezing solution, anything containing rubber would hardly be suitable.

Q.—For a gasoline pipe gasket?

A.—The gasoline pipe is generally small and the nature of the material that may be used depends upon the form of the joint. In some cases wood fiber, leather, or a thin piece of sheet lead or soft copper can be used. Regrinding the joint can be resorted to if the packing cannot be put on, or a small amount of cake soap rubbed on the joint, or, as emergency calls for it, some of the rubber solution cement for tires will answer.

Q.—What packing is suitable for a circulating pump?

A.—Any valve-stem packing for where the shaft comes out of the casing. Candle wicking covered with a mixture of oil (or grease) and flake graphite does well.

AUTOMOBILES FOR BOSTON POSTAL SERVICE.

Boston, July 9.—If the postal authorities at Washington look with favor upon a plan which has been devised by Postmaster George A. Hibbard of this city for facilitating the transportation of mails, Boston will have an extensive automobile mail service. Assistant Postmaster Frank E. McMillin has been devoting much time to the subject, and he has worked out a scheme in which automobiles play an important part. Surrounding the central Boston station on all sides are some twenty-five or more stations. Some of these are seven or eight miles from the central station, while others are in the business district. The stations in the business district are connected with the central office by pneumatic tubes, while the service between the central and suburban stations is carried on by electric street mail cars and by the steam roads.

The great defect in the system has been the inability to have mail carried promptly from one station to another, where there is no directly connecting electric car line. It is for this work that the automobiles are wanted. Experiments that have been made show that much time can be saved by the use of automobiles and that in not a few cases mail, now held over night, can be delivered the same day, if automobiles are used to carry it. The automobile service would form a sort of rim for a wheel, the hub of which is the central station and the spokes the radiating street car and steam mail lines. A request has been made of the Postoffice Department for an allowance for the automobile service and is now pending.

THE SCOTTISH RELIABILITY TRIAL

By JOSEPH A. MACKLE.

LIVERPOOL, July 2.—The second annual reliability trial promoted by the Scottish Automobile Club has proved as great a success as last year's event; higher praise than this could not be given. In four days nearly eighty cars traversed 600 miles, visiting almost every place of note in the country, without the slightest hitch in the arrangements and to the universal satisfaction of both competitors and officials.

The route was substantially the same as that of last year's event, save on the first day, when the course led south from Glasgow to Dumfries and then up to Edinburgh, where a halt was made for the Wednesday night after a journey of 174 miles. On Thursday, Stirling, Perth and Balmoral were passed on the way to Aberdeen, 177 miles being covered. Friday's run lay over the Grampians to Pitlochry, right in the heart of the Highlands, and on Saturday the travel-stained band reached Glasgow after a journey of 155 miles. On each of the days a timed hill climb was arranged, but, throughout, the hilly nature of the country was such as to severely test the climbing powers of all the vehicles.

The eighty-four cars entered were divided into five classes, on the basis of price. For cars up to $1,000 for the chassis, eight were entered, including a 10-horsepower Cadillac, an 8-horsepower Maxwell and a 14-horsepower Pope-Tribune. An English-built car of American type—10-horsepower Adams-Hewitt—also came in Class I. Of the fifteen cars in Class II, with price of chassis up to $1,750, the representatives of America were the 16-horsepower Maxwell and 16-horsepower Reo. Class III attracted twenty-two entries, of which the chassis price was less than $2,500. Twenty-seven cars were down for the $3,250 and under class, and above this figure came twelve cars in Class V. A special class had been arranged for steam cars, but the steamers had apparently no thirst for glory and no entries came along.

An official observer was carried on each car, to make note of every stoppage and incident, and also to see that the prearranged time-table was strictly adhered to.

Seventy-nine cars turned up for the weighing-in at Glasgow on Tuesday, June 12, and at 7 A. M. on the Wednesday morning, the 24-horsepower Albion was sent away, the other cars following at intervals of one minute. Through the Burns country the procession steadily advanced, making for Dumfries, where an hour was allowed for luncheon and replenishment of tanks. Tire troubles had delayed several of the cars even already; and three others besides the 8-horsepower Maxwell had to encroach on the one hour's time which alone was permitted for tire repairs during the tour. Ten miles further on the hill climb at Maffat was reached. No abnormal grades were encountered, but the mile climb included many awkward corners, which tested the drivers more than the cars. Respecting the performances of the American cars, out of the seven in Class I, the Cadillac was placed fourth, the Maxwell fifth, and the Pope-Tribune seventh. This last car had more than its share of minor troubles this day, four stops being recorded for such causes as a faulty plug and a choked carbureter. In Class II, out of fourteen cars the 16-horsepower Reo came up third and the 16-horsepower Maxwell eleventh. The Cadillac later experienced twenty-seven minutes' delay through tire trouble, but after this a non-stop performance was recorded all through, whereby F. S. Bennett repeated his performance in the 1905 trials. On arriving at Edinburgh the cars were marshalled in the garage, and after an inspection of the car and engine but without any adjustments

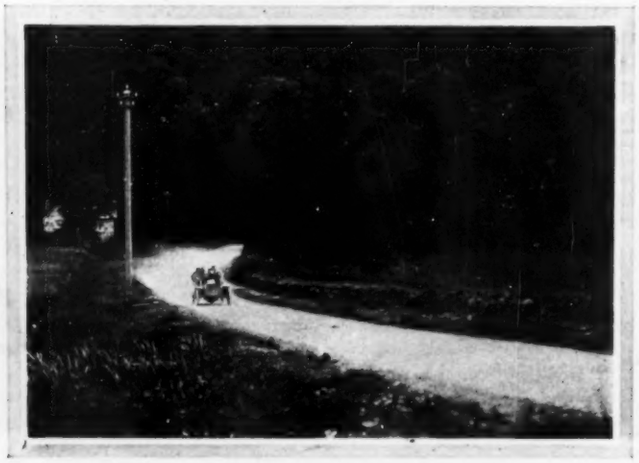
ON THE FIRST DAY OF THE SCOTTISH RELIABILITY TRIAL—CARS WAITING THEIR TURN FOR THE BIRKHILL HILL CLIMB.

16-HORSEPOWER MAXWELL ROUNDING DEVIL'S ELBOW.

being allowed, the drivers and mechanics left the building in company with the observer.

On Thursday an early start was made on the long journey to Aberdeen, and the main feature of the day was the regular running of most of the cars. One of the two lady drivers in the trials —Mrs. Riley, on a 24-horsepower Belsize—was delayed long behind the others by a puncture, and later on, when far from help, found her batteries run down and finally withdrew from the contest. The 8-horsepower Maxwell spoilt its run by a three minutes' stop to adjust the commutator, and the Pope-Tribune also experienced ignition troubles. With the exception of a minute's delay in starting the 16-horsepower Reo, the other Americans made non-stops for the day. In the afternoon a timed hill climb took place up the famous "Devil's Elbow," in the Pass of Glensheef—the highest road in Great Britain, 2,200 feet above sea-level. The hill is about three-quarters of a mile long, with an average grade of 1 in 8.9. Half way up is a double twist in the shape of a Z, with a grade of 1 in 7 to 1 in 8. All the cars successfully finished the climb, and some of the high-powered cars in Class V made excellent times. Taking the American cars, the Maxwell was second, the Cadillac fourth and the Pope-Tribune seventh in Class I, while in Class II the Reo and 16-horsepower Maxwell were second and sixth, respectively, out of fourteen cars.

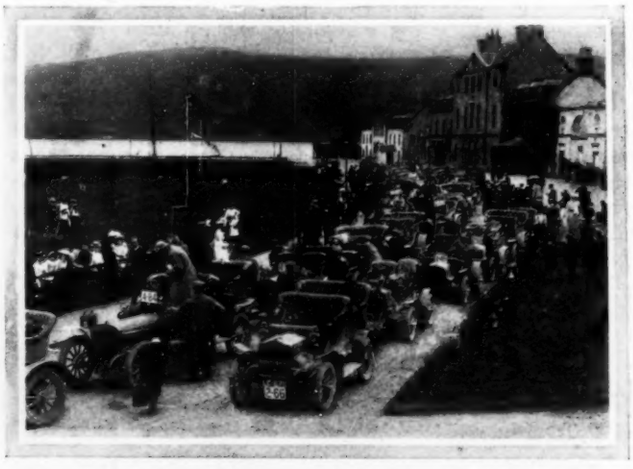
From the hill to Aberdeen the road passed through some fine scenery, Balmoral castle being seen at close quarters. A dozen or more cars experienced minor stoppages of but a few minutes' duration but six others were withdrawn. Several of these withdrawals were caused by the entrants making use of new or untested cars, and it is a matter of some surprise that makers should be willing to run in public competitions cars of which the running is as yet an unknown quality. Seventy-two cars came into the garage on the Thursday night, after completing half the trial.



ON THE BEAUTIFUL ROADWAY NEAR INVERARY.

Friday's run at first led further north as far as Keith, near Inverness, but from this point the homeward journey was commenced. The 25-horsepower Brooke was stopped three hours for magneto repairs and was withdrawn in consequence. For eighty miles the cars proceeded through a Scotch mist, with the accompaniment of a drizzling rain. Fortunately this was the only bad weather experienced during the whole tour. Just before the hill climb at Tomentoul a rather exciting incident took place. While ascending a steep rise, with a gradient of 1 in 5, one of the cars started to run backwards, and to avoid a collision with the cars in the rear, the driver steered for the ditch. The car turned over on its side and the observer was slightly stunned, but in less than an hour the car was righted and the journey resumed. An Arrol-Johnston car just in the rear was forced to swerve right off the road, and was within a few inches of a cliff with a high drop. Luckily a serious mishap was avoided. On the climb—half a mile averaging 1 in 9—the Maxwell was again second and the Cadillac fourth in Class I, and the Reo and 16-horsepower Maxwell fourth and fifth in Class II. Forty-four cars made non-stop runs on this journey, and five others experienced slight delays for tires alone.

Saturday's run lay through the Pass of Killiecrankie to the hill climb at Trinafour, nearly a mile long and averaging a rise of 1 in 12. Only one car was left behind, somewhat surprising after ascending the much more arduous Glenshee climb. The hill was more than usually acceptable to the Pope-Tribune, which came in third in Class I, followed in order by the Cadillac and 8-horsepower Maxwell. In Class II the Reo and 16-horsepower Maxwell dropped back to fifth and eleventh places. The remainder of the run, though most interesting and enjoyable, was devoid of incidents of note, and in the evening at Glasgow sixty-seven cars finished out of seventy-nine starters—an excellent proportion. The Horlick car had the bad luck to be withdrawn but three miles from the finish on account of a broken wheel, and the Scont car also withdrew after doing a non-stop run on the three previous days.



CARS HALTED AT INVERARY AT LUNCHEON TIME.

Of the sixty-seven cars that finished, twenty-five succeeded in making non-stop runs for the whole tour, including the 16-horsepower Maxwell and 10-horsepower Cadillac. The 16-horsepower Reo experienced but two minutes' delay except for twenty-seven minutes' tire troubles, which latter will not count against it. Many others had but a few minutes' stop recorded against them, and the number of serious failures or adjustments was surprisingly few. The final awards are not yet published, and reliability, hill-climbing powers and fuel consumption are all to be taken into account. So has ended the 1906 Scottish Trial, and if the present growth of popularity is maintained the event bids fair to become of international importance in the near future.

SPECIAL AUTO STEELS AND THEIR PROPERTIES*—III

By RENE M. PETARD.

THIRTY per cent. nickel steel does not differ widely from the 25 per cent. grade. It is, however, still better adapted for stamping work, hot or cold, is still more resistant to deteriorating agents, and shares with them the practical absence of expansion when heated.

Characteristics of 30 per cent. nickel steel:

Treatment.	E.L.	T.S.	Elong.
Annealed at 900° C.	22	58	38 p.c.
Tempered at 900° C.	20	56	44 p.c.

Nickel Chrome Steel.

Although this is a steel which will be recognized as a quaternary steel, according to what was said in the first part of the study, we shall deal with its properties right after those of the ternary nickel steel, as they are somewhat similar.

This type of steel was borrowed by the automobile industry from the armor plate makers. It is somewhat intermediate in its general properties between the 3 per cent. and the 5 per cent. nickel steels already referred to. Its treatment and its uses are very much the same as those of the latter grade, but its characteristics are rather exceptional and are as follows:

	60 K. grade (semi-hard).			70 K. grade (hard).		
Treatment.	E. L.	T. S.	Elong.	E. L.	T. S.	Elong.
Annealed at 900° C.	45	65	18 p.c.	54	75	14 p.c.
Oil tempered at 850° C. and annealed at 550° to 600° C.	65	77	14 p.c.	80	92	10 p.c

For forging and general use in machinery the softer grade is preferred, as it is easier to machine, and the heat treatment can be made with greater certainty of success. The harder grade is used for warship protection and for armor plates, and after special heat treatments resists perfectly the impact of projectiles.

As a rule this type of steel permits a combination in part of two qualities long considered incompatible by the metallurgist: hardness and great resistance to the shocks and to alternate stresses. In this respect it is even slightly better than the best nickel steels. The greatest difficulty, however, with most of the grades found on the market resides in the heat treatment. This latter is too often very difficult to perform satisfactorily on account of the narrow range of temperature allowed for the operations, the least mistake often leading to entirely unexpected and contradictory results. Some factories have, however, succeeded in obtaining less exacting grades of material, and these give entire satisfaction.

In automobile construction they are more especially used for crankshafts. These, suitably tempered and running on phosphor bronze or friction-metal lined bearings, are practically indestructible, and they present the further advantage that even when tempered they can be worked in the lathe by using very hard metal tools, thus avoiding the common difficulties attached to this work on the ordinary casehardened and tempered carbon steel shafts.

It is also used for gears, but for this work, in which the metal works against a surface of similar metal, a few makers contend that it is not sufficiently hard, while some others say, on the contrary, that this is of little importance, as, both wheels being of the same degree of hardness, there is no reason why one should cut the other, and the qualities of the metal as regards absence of fragility appeal to them in a more than ordinary manner when the strains on the teeth of the usual sliding gears are considered; late experience seems to show that truth is on the side of the last-mentioned class of makers.

Silicon Steel.

The automobile industry makes use of steels containing small percentages of silicon, from 0.8 to 1.5 per cent. It should be noted here that in many instances the presence of silicon in a steel is considered as an irreparable evil, leading the material to scrap, and it is only in specially treated steels, such as those which interest us here, that this material has been found to have more than an indifferent influence.

The usual silicon special steels also contain very small quantities of manganese, as also does practically any steel on the market, even of the lowest grade. The influence of this manganese has not yet been very clearly found, and the probability is that this component is merely an indifferent, harmless guest in the metal. It, however, has been sufficient for some enterprising business men to decorate their silicon steels with the pompous name of "mangano-siliceux" and take more money for it, without any other apparent reason.

Silicon steels have varying characteristics, and, as their composition is still kept secret by most factories, no positive figures can be given concerning them.

These steels, after tempering and annealing, are very resistant to shock and sufficiently hard, but it appears that a perfect combination of these two qualities is rather difficult to obtain with them.

They are sometimes used to make carriage springs, but more often for the manufacture of automobile gearing. The main difficulties attached to their use are the following:

The grain is such that they are generally extremely fragile in the direction perpendicular to that along which they were rolled at the mill; in order to counteract this it is necessary to forge the blanks very thoroughly in all directions so as to make the metal homogeneous. If a gear blank thus carefully forged is afterwards finished and suitably treated, the safety is maximum, but if it is merely turned out of the bar and the teeth cut there will be a direction in which the metal will be ready to break at the least shock and all the teeth on the corresponding sides will at once be stripped.

Lastly, more for this steel than for any other special steel, one is confined between two alternatives: fragility and hardness, or resistance, and comparative softness. If too much annealed the metal will be too soft; if not sufficiently it will be comparatively brittle.

The average composition, as obtained from manufacturers willing to disclose it, is from 0.8 per cent. to 1.5 per cent. of silicon with corresponding percentages of carbon, from 0.5 per cent. for the richest in silicon to 0.8 per cent. for the poorest.

Manganese and Tungsten Steels.

The first practical manganese steel was obtained by Mr. Hadfield, of Sheffield, England. It had long been searched for by metallurgists, and, although it does not present any special applications in automobile construction on account of its price, it is interesting to note it here on account of its rather apparently contradictory properties. It is hard, harder in fact than any other special steel, and at the same time entirely devoid of brittleness; it is not magnetic, is not affected either by tempering or by annealing, and is practically impossible to machine when cold. It finds a large field for tool-making and for similar special purposes.

The manganese becomes more interesting when it is combined with other elements in sufficient proportions to play an active part in the nature of the steel thus formed, which then belongs to the quaternary or to even more complex classes. These steels when hated to an orange red color and slowly cooled in the air are self-tempering, as are some nickel steels already mentioned. They are generally composed of 2 to 3 per cent. manganese, 4 to 6 per cent. tungsten, and a high quality of carbon.

Tungsten steel is extensively used in France for the manufacture of carriage springs. Experiments had been made with it some years ago for railroad work; the results were extraordinarily satisfactory, but the price was prohibitive. This was taken up again for the automobile industry, and resulted in many tung-

*Continued from page 5, issue of July 5, 1906.

sten steel springs being made for the highest grade of cars, and more especially for racing machines, in which they permit a considerable saving in weight.

This question of steel for automobile springs is sufficiently interesting to receive more than passing attention, and will be treated here, although tungsten steel, which is one of the most important ones used, is far from being the only one.

Steel for Springs.

Taking first the more commonly used metal, which is carbon steel, we find that the material employed by the best makers is a superior grade of Martin steel, made of the purest cast iron, fine grained, mixed with carefully selected samples of iron and steel.

The tensile strength, in natural state, sometimes reaches as high as 75 to 85 kilos, with an elongation of 16 to 20 per cent.; after tempering and annealing the tensile strength reaches 120 to 130 kilos, with an elongation of 7 per cent. and an elastic limt of 80 to 90 kilos.

The silicon steel is obtained by the same process, heavily silicon-laden metal being added after complete liquefaction of the other components. Its characteristics when used for spring manufacture are:

	T.S.	Elongation.
Natural state	80 to 90 kilos.	12 p.c.
Tempered and annealed	140 to 150 kilos.	8 p.c.

This steel is remarkable by the amount of bending which it will stand before breaking if properly made, and the closeness with which it will approach its original form after being released.

The Tungsten steel used for springs is prepared in crucibles, out of the highest grades of materials. The cast iron used comes from the purest ores known and is fine grained; it is broken in minute particles and is hand-selected by experts. The characteristics are much the same as those of the silicon steel, but the metal presents the same precious qualities as regards the special object aimed at to a still greater degree.

Wolfram Steel.

This is used exclusively for springs in automobile construction. After preparation with the same care as the steels already discussed, in the selection and treatment of the materials, it is patiently forged for a long time to compress the metal and still increase its quality. Tempered in cold water at a temperature of 850° to 900° C. and broken, the metal presents an extremely finely grained texture, with a bright break possessed of a silk-like appearance.

Tempered as above and annealed to 600° C., the steel presents a wonderful resistance to rupture by bending. The tensile strength in natural state is 80 to 90 kilos per sq. mm., with 15 per cent. elongation; tempered and annealed, the elongation is still 9 per cent., with a tensile strength of 150 kilos.

Lastly, the same results have been obtained with molybdinum steel as with tungsten steel, all the characteristics and the behavior of the steel being the same, except that to obtain this similarity of results it was necessary to use four times more molybdinum than was needed of tungsten.

To conclude this study, a detailed exposition of the qualities of vanadium steel, which is of great importance to-day on account of the prominent place which it has taken in the English industry, will be given in a later issue.

At the twentieth show of the German Agricultural Society in Berlin last month, the MacCormick Harvesting Machine Company's exhibit was much discussed, especially the gasoline motor with three ignitions. England was represented by the well-known Ivel motors and the German motors were more or less all alcohol-driven, and fitted well into the frame of the exhibition. But the German agriculturists are not friendly to motors, and this very powerful party in the German Diet is mainly responsible for the present taxations.

The 1907 Herkomer contest is to finish at Homburg and wind up with a race over the 1904 Gordon Bennett circuit, instead of the speed trials in the Munich-Forstenried Park.

NEW LAW IN DISTRICT OF COLUMBIA.

WASHINGTON, D. C., July 9.—Much to the surprise of the automobilists of this city, Congress got busy just before the last moment before adjourning, and passed the bill regulating the speed of automobiles in the District of Columbia. President Roosevelt hastily affixed his signature to the act and it is now on the statute books. The law as finally enacted is far more equitable in its terms than that first proposed by Representative Sims, due to the hard work of the Automobile Club of Washington and a number of local dealers, including J. M. Stoddard, of the Cook & Stoddard Company, and C. Royce Hough, manager of the Washington branch of the Pope Motor Car Company. As a great many automobilists visit Washington with their cars during the course of a year, the text of the new law will be of interest just at this time. It is as follows:

No person shall drive or propel, or cause to be driven or propelled, any automobile, horseless or motor vehicle, bicycle, or horse-drawn vehicle within the fire limits of the District of Columbia, as said fire limits are now defined or may hereafter be defined from time to time in and by the building regulations of said District, upon any street, avenue, alley, or public highway at a greater rate of speed than twelve miles an hour between intersecting streets and avenues; nor at a greater speed than fifteen miles an hour through any of the parks within said District; nor across streets at a greater speed than eight miles an hour; nor at a greater speed than six miles an hour around corners of any street or avenue; nor at a greater rate of speed than four miles an hour on the east side of Fifteenth street northwest between the south building line of G street and the south curb line of New York avenue; nor on the west side of Fifteenth street northwest between the line which would be the south building line of G street if extended to the west side of Fifteenth street and from said extended line north to the north curb line of Pennsylvania avenue; nor at the intersection of Ninth and F streets northwest between the building lines of the said streets; nor at the intersection of Ninth and G streets northwest between the building lines of said streets; nor at the intersection of Eleventh and F streets northwest between the building lines of the said streets; nor at the intersection of Eleventh and G streets northwest between the building lines of the said streets; nor on any public roadway, street, avenue, or alley within said District outside of said fire limits at a greater rate of speed than twenty miles an hour; and when meeting or passing any other vehicle the speed shall not exceed twelve miles an hour, and any automobile shall be brought to a full stop whenever the driver of a horse-drawn vehicle shall signal by raising the hand, and said vehicles shall at all times be under the control of the driver or operator; and the driver or operator and the owner or proprietor riding thereon or therein violating any of the provisions hereof shall, upon conviction for the first offense, be fined not less than five dollars nor more than fifty dollars, and shall, upon conviction for the second offense within one year from the commission of the first offense, be fined not less than ten dollars nor more than one hundred dollars, or imprisoned for not less than five days nor more than thirty days, at the discretion of the court; and shall, upon conviction for the third offense within one year from the commission of the first offense, and for any and all subsequent offenses, be fined not less than fifty dollars nor more than two hundred and fifty dollars, and be imprisoned in the workhouse for not less than thirty days nor more than six months.

Sec. 2. That prosecutions for violation of the provisions of this Act shall be on information filed in the police court of the District of Columbia by the corporation counsel or any of his assistants.

Sec. 3. That this Act shall not be held to take away the authority of the Commissioners of the District of Columbia to make police regulations not inconsistent herewith.

DANVILLE, ILL., ALSO CLAIMS AUTO HONORS.

DANVILLE, ILL., July 2.—This town now has 65 machines. In the matter of variety of makes, Danville perhaps has the record of the Central West. It has all of the leading machines, and a great showing of others. It has been noted that the men who are disposed to use the auto for commercial purposes have had trouble in getting the right kind of men to handle the cars. There is a growing demand for careful, sensible auto drivers to handle machines for other than pleasure purposes. A dry goods firm in this town undertook to use a big machine to deliver its goods. It failed, and the machine was sold to a grocer, who also failed to operate it. The only trouble was that the right kind of a man could not be secured to run the car. The same car next passed into the hands of a truck gardener, who is his own driver, and he has made a great success of the venture, through careful attention to details and to business.

The trouble has been that when a man who is able to take care of a machine and keep it in order, is careless on the road and runs over people, and disregards the rights of others. The commercial men want to get hold of the kind of men who are machinists to the extent of understanding the mechanism of the car, and careful and sensible enough to handle it on the highways. The higher priced machines are being brought to Danville. The garage and livery business is good.

APPAREL APPROPRIATE FOR TOURING

By HARRY W. PERRY.

AUTOMOBILISTS who expect to do much touring find it necessary to provide themselves with rather extensive wardrobes of special garments for the purpose, if they wish to derive the maximum of comfort and pleasure from the pastime. In this matter, as in the equipment of the car itself or in preparing for other forms of recreation, there is plenty of room for the exercise of judgment in making the purchases suit the purse and in selecting garments adapted to various conditions of weather so that the carrying space in the car will not be overcrowded with the automobile clothing of the party to the exclusion of the ordinary clothing.

PONGEE SILK DUSTER.

Those much-to-be-envied tourists who are enabled to devote a whole summer season to the delightful pastime need a more extensive line of special clothing for the purpose than the much larger class of automobilists who usually can spend only a few days, or possibly a week or two at a time in road traveling by automobile away from home. However, extreme changes of weather do not occur so suddenly that such tourists cannot with safety have large portions of their wardrobes sent ahead to await their coming, or leave them at home to be ordered sent by express when needed.

Some of the Essentials.

There are certain essentials to comfort even when touring for but a week that must be provided. These include dusters or long coats to protect the ordinary clothing from the clouds of dust that arise from the road in dry weather, goggles for the men and hoods and veils for the women, gauntlets for the driver if he would keep his hands free from grime and sunburn, hats or caps that will not easily blow off the head, and waterproof coats for protection when suddenly caught in the torrential downpours of rain that occur even in summer in the mountainous country in which automobilists most delight to do their touring.

PONGEE LONG COAT.

For hot, dry-weather use there is offered an extensive line of dusters and long coats made of various materials. The dusters are commonly made of linen or mohair, and, besides being comfortable and cool, are about the lowest-priced automobile garments made. They are made in both single and double-breasted styles, with turnover collars that can be turned up and buttoned under the chin so as to fit closely around the neck, excluding the dust and keeping the collar clean. Many of them are made with cloth straps attached to the ends of the sleeves so that they can be buttoned tightly around the wrists of the wearer to prevent dust from blowing up his arms. Three pockets are provided in the garment.

Pongee Silk Coats for Men and Women.

Dusters serve their particular purpose admirably, but in event of a shower they soak up the rain like a sponge. For this reason a great many tourists prefer to wear the pongee silk duster or long coat that is impervious to dust, and at the same time will keep the wearer dry in a moderate shower. The pongee coats are made in styles similar to the dusters and come in various weights, most of them being lighter than the linen dusters, but others heavy and close woven enough to resist considerable rain. Pongee coats are great favorites with women, for whom they are made in a variety of styles. They are usually of the natural straw color, made double-breasted, with turnover collar, plain or leather trimmed, and with cuffs and large sleeves; many have double capes covering the shoulders. The coats are made very loose fitting and are soft, cool, comfortable and durable.

PONGEE DUST COAT.

Rainproof Silk-Rubber Coats for Women.

Of all the summer automobile garments for women probably the most popular are the long coats made of silk treated with rubber and variously designated by the makers as silk-rubber, satin-gum and rubberized silk coats. All have the silk or satin finish outside, very fine in texture, of any desired color, and with the inner side prepared with rubber like gossamer. Made full length and extremely loose like the dusters and pongee coats, they are featherweight garments that are cool and comfortable even in hot weather, waterproof in a hard rain, and not injured by dust particularly if of a suitable color. They possess the further quality of giving the wearer a well-dressed appearance and of lending themselves to much trimming and ornamentation, some of these coats being very elaborately trimmed. Prices, of course, vary accordingly. The same material is sometimes made up into suits consisting of separate skirt and long cape, or skirt and loose-fitting short coat. In nearly all cases the collar fits rather close about the neck and the cuffs are small, although the sleeves are baggy as the mode is at present.

Silk Hoods to Protect the Head.

With any of the foregoing coats for women a hood of silk or pongee is worn to cover the hat and protect the hair and back of the neck from dust. In an open car, if there is no folding top either raised or lowered, and no dust-guard at the rear, the motion of the machine causes eddies of air at the rear of the car, so that the dust curls up and falls forward directly upon the heads and shoulders of the passengers in the back seat. For this reason the women, who usually occupy the rear seat, need thorough protection against dust. Hoods are made in a large variety of styles, but in general they

LEATHER RIDING HABIT.

are bag-shaped to rest upon the top of the hat with the loose end falling upon the shoulders. In front a piece of flexible mica is inserted to give an unobstructed view, and there are ribbons for gathering the lower part of the hood closely around the neck. Some hoods are made without covering for the face, and some have long, flowing ends to come down well over the chest.

Women's Hats, Caps and Veils.

SOFT KID HAT.

Women's hats and caps for automobiling also come in a large variety of styles and materials, as might be expected to satisfy the feminine desire to have something "different." Leather (kid and patent leather), felt, straw, silk, and silk treated with rubber, are the materials most used for summer hats and caps. The head coverings are made rather small, low in the crown, and with little or no trimming, so that they can be covered readily with the hoods and the dust can be brushed off of them easily. Some hats are made with hoods attached, and others have an adjustable shield that can be pulled down in the back to protect the back of the head.

Veils are made of chiffon, to go over the hat, and are dyed in a large variety of colors. Some have goggles or mica eye shields sewed into them, and others are very fancy, the latest novelty being hand-painted veils.

Gauntlets with Ample Cuffs.

Gauntlets are worn by both men and women. They are made of calf and kid in black and tan. They are stout and close-fitting around the wrist, but have flaring cuffs to extend up over the ends of the coat sleeves so as to exclude the wind, rain and dust. Driving gauntlets have very strong palms, and a novelty has lately been brought out in the shape of a gauntlet having the palms and inside of the fingers and thumb studded with steel rivets having milled surfaces to provide a good grip on the steering wheel and prevent wear of the leather. Some of the gauntlets are made waterproof.

SILK HOOD, MICA FRONT.

Men's Caps for All Weathers.

Men's caps are made principally of leather, wool, cravenette, khaki, pongee silk, linen and straw. For hot weather use the pongee is a very light and cool cap, and does not absorb the rain in a shower. Dust does not show on it, and it can be washed. The wool cap, in checks or plaid, and made like a golf cap, is much used for touring, while the leather (kid or other soft skin) cap is an old standby for all seasons and weathers. Cravanette caps have had a great vogue, and are made with ear flaps that button on top of the cap when not in use. When there is frost in the air the flaps can be brought down over the ears and buttoned under the chin. A portion that pulls down at the back protects the back of the head against cold winds. A very serviceable cap is of leather and cravenette, so made that it can be turned completely inside out, making a leather or cloth cap as desired.

Goggles in Great Variety.

Every motorist must have goggles, of course, when touring. The experienced driver is glad of the relief when driving conditions permit of their removal, but country roads are almost invariably dusty when they are not muddy, and even when the wind is in a direction to blow the dust behind the machine, the tourists pass other vehicles at frequent intervals and have to take their dust for a time. Unless goggles are worn the eyes become filled with an impalpable dust that irritates the eyeballs and lids so that they smart painfully through the night. Goggles also keep small gnats and flies out of the eyes. Such insects are especially thick toward evening and along well shaded roads, and some species secrete a strong acid that smarts sharply when they get into the eye. In such a case the instinct to rub the eye with the hand is so strong that the driver may involuntarily remove his hands from the steering wheel for a moment and may conceivably let the machine run into the ditch or over an embankment at a turn.

One of the most used goggles in the summer season is the style made without any attached face mask and with collapsible cups. The edge which rests against the face is lined with chenille and is shaped to fit the contour of the features snugly. The very fine mesh of the cups permits a cooling ventilation, while at the same time keeping out the dust. When not in use, the glasses, which in some are hinged at the middle, fold over, and the mesh collapses so that the goggles can be inserted in a small case easily carried in the pocket. Other styles of goggles have face masks of pongee, pigskin or other material either permanently or detachably fastened to them. Later wrinkles in the goggles line are adjustable frames with screw mechanism for spreading the glasses apart so that the frame will fit noses of different sizes, and goggles made with frames having clasps that permit removal of the lenses and substitution of other glasses either smoked or colored.

CAP WITH PULL-DOWN CAPE.

Washable Pneumatic Cushioned Goggles.

One of the newest goggles to appear upon the market has just been brought out. It has cups made of aluminum, and where the edges rest against the face there is a small pneumatic rubber cushion to relieve pressure upon the blood vessels. The cups are ventilated by means of a gauze-protected air space around the entire circumference of the lenses, so that moisture from the face will not condense upon the glass. The lenses are curved and shaped so as not to obstruct the vision downward or to either side. A single small link connects the two cups, permitting them to be folded snugly together and inserted in a special case to go in the pocket. This new goggle can be thoroughly washed in water and soap without injury. Goggle makers now even produce face masks with glass eye-pieces for the pet dogs that some tourists like to carry with them. A recent refinement in goggles is the fitting of tiny mirrors at the sides, so that the driver can see objects coming up behind without turning his head.

GOGGLES WITH ALUMINUM CUPS AND PNEUMATIC CUSHIONS.

Leather Garments for Cold and Wet Weather.

Leather garments continue to hold favor for nearly all sorts of weather, but more especially for cool and wet weather. They are about the most serviceable sort of clothing for automobiling because the material is practically indestructible with ordinary usage, resists cold and wet, and yet is soft, warm and comfortable. Many kinds of hides are employed for these garments, but calf, goat and sheep skins are very largely used for men's coats, vests and trousers, while kid of the softest and most pliable kind is most largely used for women's coats.

MEN'S GAUNTLETS WITH LARGE CUFFS.

A leather suit for men comprises a double-breasted jacket, vest and trousers. Leather leggings should also be used with such suits; they are made with and without straps, the latter style having steel strips in the overlapping edges so arranged as to interlock and hold the legging in place. For very wet weather driving there are long, black leather leggings that reach all the way up over the thighs.

Three-quarter and full-length leather coats to be worn over the regular clothing are also made, double-breasted, close-fitting around the neck, and with ample pockets protected with flaps.

Long Leather Coats for Women.

A still larger variety of leather garments is made for women. They include tailor-made jackets in many styles, Norfolk jackets, loose-fitting coats in three-quarter and full lengths, with high rolling collars and breast pockets, and belted-in Parisian model coats. Many of the women's coats are trimmed elaborately with leather, often with touches of red or blue. The capacious kid coats are supplied in an assortment of colors, from natural light straw color to deep red, purple or dark blue. Some of the coats are made reversible, leather on one side and cloth on the other.

Men's Waterproof Rubber Shirts and Coats.

In excessively wet weather nothing provides more perfect protection against the rain and mud than the rubber "shirt" for men. This has an elastic rubber yoke with an opening for the head to pass through, and has elastic wristlets inside the sleeves. The body of the shirt is made with no opening whatever, except at the bottom of the skirt, the garment being put on over the head. The body is made of light-weight, rubber-treated cloth, mohair, shower-proof serge or rubber-coated silk. Another style of rubber shirt is opened down the length of the chest in front and has three buttons and a high, close-fitting collar to keep the rain from running down inside. It is furnished with a waterproof bag, in which it can be folded to be carried in the car safe from injury.

STRONG GAUNTLETS FOR WOMEN.

In addition to the rubber shirts there are rubber coats in black, white and tan colors, heavily coated and impervious to the heaviest downfall of rain. They are double-breasted and have high collars that can be upturned around the neck and buttoned close. They reac hto the shoe tops and protect the legs when sitting.

Women's Counterpart of the Rubber Shirt.

A counterpart of the rubber shirt for the men is made for women. It is made of unlined rubber or rubberized silk or satin and reaches almost to the bottom of the regular skirt. It has an elastic rubber yoke and collar with an inside shield formed like a V and extending from the neck down in front far enough to allow the coat to be slipped on over the head without disarranging the wearer's hair. The cuffs fit close to exclude rain and wind. and keep the arms dry and warm.

LEGGING.

For disagreeably cold or wet weather there is a large line of cloth coats for both men and women. They are made of wool, cheviot, worsted, cassimere, and cravanetted cloth, and are plain, checked, striped or plaid. The shapes are much like those of the dusters and pongee coats, and in most cases they are double-breasted and leave wide collars that can be turned up around the head when the air is chilly or boisterous.

Dress for Chauffeurs.

Professional operators nowadays generally wear garments that are distinctive from those of the owner of the car and the rest of the party. Leather is much used by chauffeurs, whose work makes dusters and long coats somewhat troublesome, though in cold weather a reversible leather and cloth overcoat or similar garment is often necessary. Soft leather caps with patent leather visors are much worn, and leggings that fit the limbs snugly facilitate operating the pedals and leaving and entering the car. Gauntlets and goggles complete the chauffeur's special automobile outfit. Lap robes are desirable in all weathers. On warm, dusty days a pongee silk robe keeps the dust from settling on the edges of the skirts and trousers not otherwise protected, and in wet or cold weather the leather robe lined with woolen cloth keeps the passengers comfortable. Such robes are made with a pair of large pockets that are found convenient. For the chauffeur or the man who drives his own car there are special clasp robes and steering aprons that come up to the waist and cover the legs and knees. Steel half hoops inserted in the clasp robe hold that garment in place on the body, yet allow it to be instantly removed.

LEATHER LAP ROBE WITH POCKETS.

Variety Permits Judicious Selection.

While the foregoing enumeration and description of the different kinds and styles of automobile clothing may seem formidable, it is to be remembered that by careful selection one can choose a few garments that will be adaptable to almost all weathers and will not occupy too much space when traveling.

We are indebted for the illustrations which accompany these descriptions to the Scandinavian Fur & Leather Company and E. B. Meyrowitz, Optician, both of New York City.

THE F. A. M. ENDURANCE TOUR.

By A CONTESTANT.

True to schedule the annual endurance contest of the Federation of American Motorcyclists started Monday, July 2, at 4 A. M. from the corner of One Hundred and Tenth street and Broadway. An enterprising photographer had set up his camera to take a picture of the start, but as he was evidently not accustomed to be up at that time in the morning, or at least to get up at that time, he overlooked the conditions of light and neglected to provide a flash lamp; and did not secure a picture. Thirty-five contestants lined up for the start; of this number twenty-three rode chain-driven machines of practically the same pattern, and twelve rode belt-driven machines of various makes and patterns. Four of these used flat belts, seven V shaped, and one round.

The route lay across Kingsbridge to Yonkers, Tarrytown, Ossining, and Peekskill, forty-five miles from the start, which was the first checking station. Here the leaders were over three-quarters of an hour ahead of time, and they had to wait for the checker to arrive before going on. The route then led by Garrisons, Nelsonville, Fiskill Village, and Wappinger's Falls to Poughkeepsie, the first control, where the contestants were due at 9.13 A. M.

Features of the Checking System.

It might be as well to explain here that checking stations were established to insure that the contestants took the official route, and it did not matter at what time they passed through so long as they signed the score sheet. On the other hand, if a contestant arrived at a control over 15 minutes ahead of the schedule time, he was disqualified, or if 15 minutes late, he lost his perfect score. Most of the more experienced riders, therefore, kept up a fairly fast pace, so that in case of breakdowns or losing the road, they could have as much time as possible to make up for the loss. Therefore, in many cases they were away ahead of time upon nearing the control, and just about a half mile from the control, they waited for time to arrive when it would be permissible to enter the control. The schedule was figured on a basis of fifteen miles per hour.

Of the 35 starters, 33 were reported at the Poughkeepsie control, and all but one of these had perfect scores; 32 arrived at Albany and 29 of this number were within the time allowance to secure perfect scores. From Albany the route passed through Schenectady, and many small villages to Amsterdam, the next checking station. The roads from this point varied greatly from sand to macadam, but the bicycle side-paths rendered the way comparatively easy.

From Amsterdam the route lay through Fonda, Fort Plain, and Palatine Bridge, to Little Falls, the night control. Most of the way it ran parallel to both the railroad and the canal. Twenty-five of the contestants signed the score sheets at Little Falls, 23 of these having perfect scores to this point, 228 miles from New York.

How the Run Was Finished.

The second day the route led to Utica and Rome, which were checking stations; thence through Oneida to Syracuse, the first control, where 22 reported on time. At Syracuse a very elaborate lunch was provided for the contestants. The route led from Syracuse through Eldredge, Weedsport, Port Byron, Savan, and Clyde to Lyons, the last checking station. At this point 21 reported, and probably if it had not been for the rain which commenced to fall in torrents about half-past three, nearly all of these would have reached Rochester (389 miles from New York) on time. As it was, however, the rain entirely changed the status of the case, and only five earned perfect scores. As for the survivors, some took to the tow path and one to the railroad track. Those who won perfect scores were S. T. Kellog, George N. Holden, J. B. DeRosier, Bert S. Barrows, and O. Hedstrom, all of Springfield, and S. J. Chubbuck, of Toledo.

The following are entitled to survivors' medals by finishing within five hours of schedule time. L. J. Mueller, of Cleveland, B. A. Swenson, of Providence, and John A. Slicher, of Mount Vernon, W. F. Mann, of Yonkers, and Ed. Buffum, of Toledo.

It is very hard to draw any inferences as to the desirability of chain over belt, but it seems that the results of the first day's run would show the chain to be much superior for average road work in this country. Of the twenty-five who arrived at Little Falls, 17 rode chain-driven machines and all of these had perfect scores. Of the other 8, which were belt-driven, 6 had perfect scores. Another remarkable thing is the good showing of the flat belt machines as against the V shaped belt, so popular abroad. Three out of four of these finished and one got a perfect score, the only belt machine to do so. This should not be given too much weight as all the riders of the flat belt machines were seasoned, experienced riders, while some of those riding the V belt machines were not. Nevertheless, the fact is interesting.

The following arrived at Lyons, but did not report in Rochester in time to be considered survivors: George Wagner and B. Fremont, of St. Paul, Wagners; Harold H. Brown, of Boston; A. S. Noonan, of Rome, N. Y.; E. W. Goodwin, J. Cox, Jr., of New Haven; J. Bradenburg, New York; William Slicher, of Mount Vernon; Fred H. Baker, of Brooklyn; Henry Jarmine, of New Haven; and Edward Brereton, of New Haven.

Two things worthy of note might be mentioned. One of these is the almost entire lack of troubles with the motors and the other the general good fellowship and the desire to help one another through the run. Almost the only troubles were punctured tires and broken pedals—this last during the last part of the run.

F. A. M. ELECTS OFFICERS.

ROCHESTER, N. Y., July 9.—The Federation of American Motor Cyclists, holding its fifth annual meeting at Rochester, last week, elected the following officers: President, R. G. Betts, New York; secretary, Henry J. Wehman, New York; treasurer, C. R. Gibson, Westboro, Mass.; vice-presidents, Eastern district, Theodore K. Hastings, New York; Southern district, Howard A. French, Baltimore; Western, I. R. Hall, Chicago; Pacific, F. M. Byrne, San Francisco.

Thursday's events included a road race, in which J. B. de Rosier of Springfield, Mass., starting from scratch, attained the record-breaking speed of approximately a mile a minute over a twenty-four-mile course on the West Henrietta road. De Rosier's time was 26.31 1-5 for the twenty-four miles.

Track events were run off at Crittenden Park, on a half-mile circle. The feature was the hour national championship, won by S. T. Kellogg, of Springfield, Mass., who went 42 1-16 miles.

KANSAS CITY'S SEVERE POLICE JUDGE.

Even if Kansas City has no automobile speed ordinance, it is the purpose of Police Judge Kyle practically to create one by the course he has mapped out. P. H. Eskridge, a chauffeur for the Cadillac Automobile Company, was fined $110, June 28, for speeding. When he said he thought the fine excessive, the obliging magistrate raised the ante to $250. Incidentally he stated that bonds in case of a speed arrest would hereafter be $100, instead of the usual $10. The chauffeur, when a policeman tried to stop him, nearly ran down the officer, who captured him after a strenuous chase of half a mile. He was taking gasoline to a car which was stalled and was said to have been running at close to a two-minute clip. The judge stated also that he thought twelve miles an hour fast enough, and that he would base his fines on excess over this rate.

SPEED CHANGING GEARS—THE SLIDING GEAR

BY way of rough-and-ready explanation it may be said that the power delivered by a gasoline motor is in proportion to the number of explosions occurring in a given time—the more explosions per minute the more power, and *vice versa*. Thus the motor, when running slowly, is developing comparatively little power. Now, the automobile often needs the highest power it can muster when moving very slowly, as when pulling through deep sand, or starting on a grade, or climbing a steep hill. On the other hand, however, when the car is running on a smooth, level road comparatively little power is required at ordinary speeds, and it is then desirable to run the engine only as fast as is necessary to develop the requisite driving power, avoiding the wear and tear and waste of fuel that would accompany the development of an excess of power. It is easy to understand that if the gear ratio between the motor and the driving wheels is such as will allow the motor to turn over at high speed while the car is moving slowly, the engine will develop the power necessary to pull the car up hills and through bad roads, but will give only a low speed on the level, though wasting a great deal of energy. It might be compared to setting an elephant to pull a sulky. On the other hand, if the gearing is such that a reasonably high speed can be maintained on the level, the first stiff grade or bad stretch of sand would bring the engine to a stop, the resistance being in excess of the power.

Obviously, then, it is necessary to introduce between the engine and the driving wheels some means for changing the gear ratio at will. By gear ratio is meant the number of revolutions made by the crankshaft of the engine while the driving wheels revolve once. The usual method is to make use of gears of different sizes which can be brought together in different combinations or entirely separated according to momentary requirements. This group of gears is commonly referred to as the transmission—though it forms only one link in the complete transmission system, properly speaking—or the change-speed gear. Besides the gear transmissions, there are friction systems and belt transmissions, the latter, however, being practically extinct owing to the tendency of automobile service to exaggerate the well-known faults and failings of belts.

Various Types of Transmission Gears.

Of the gear transmissions there are many kinds. In the sliding gear transmission, one of the most familiar types, there are two parallel shafts, each carrying gears of different sizes. The gears on one shaft can be slid along into and out of mesh with the gears on the other shaft, thus forming different combinations as the different gears are brought together. There are many subdivisions of this type, but the broad features are the same in all. This is the transmission mechanism commonly used on large cars, and is probably more extensively used than any other one type. Sliding gear transmissions are made that permit from two to five different gear combinations or "speeds" in addition to a reverse, the usual limit, however, being four speeds, and the most commonly used the three-speed type. In referring to the number of speeds obtainable by any transmission the reverse is always excluded or else named separately, as "Three speeds and reverse" or "Two forward speeds and reverse," no more than one reverse speed ever being used.

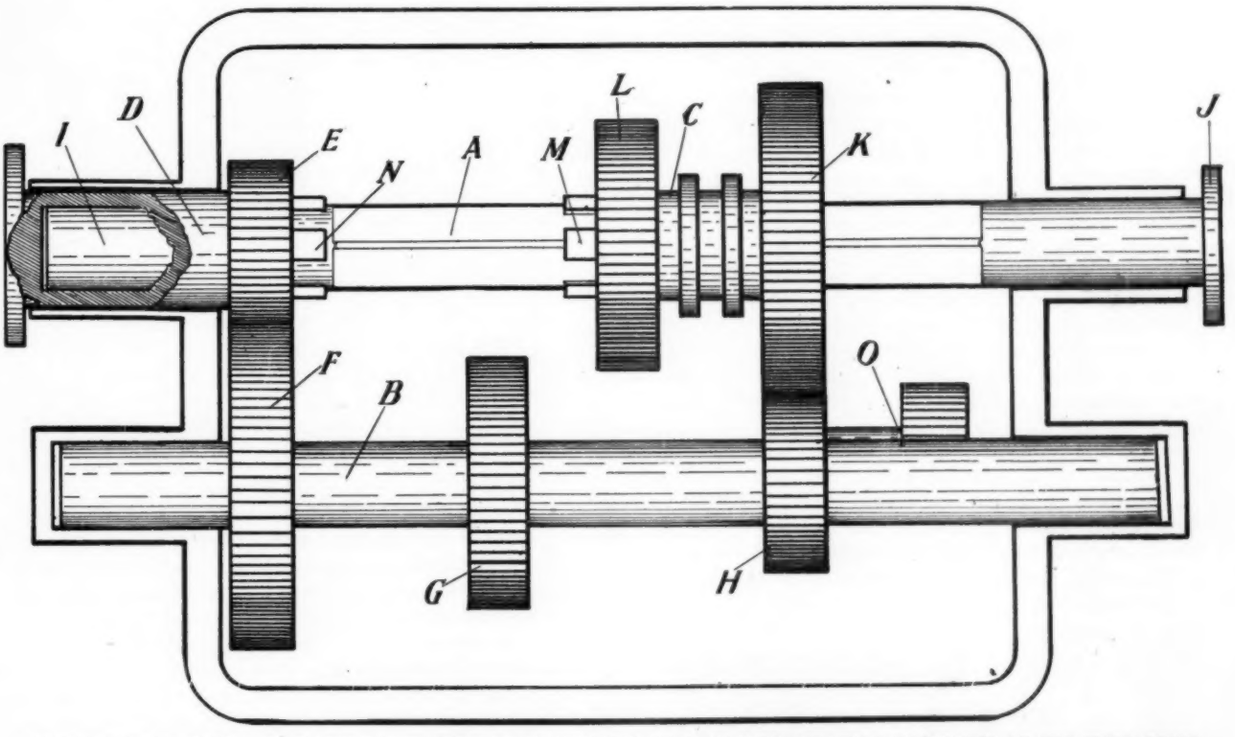


DIAGRAM OF TYPICAL THREE SPEED AND REVERSE SLIDING GEAR TRANSMISSION WITH DIRECT DRIVE ON THE HIGH SPEED.

Then there is the planetary transmission—a type very widely used for small cars, but within the last year or two greatly improved and adopted by some makers of cars up to 40-horsepower. The planetary transmission is a development of the sun-and-planet gearing principle, and consists of groups of gears carried on the adjoining ends of a divided shaft and on a floating plate, the gears being in mesh at all times. One of the advantages of the planetary transmission is that there are no gears in operation when the high speed is in use, the whole transmission rotating bodily with the shaft. The effect is the same as if the shaft were of a single piece, undivided. Usually planetary trans-

missions are made to give two speeds forward and a reverse—the high speed being on the direct drive with no gears in operation, the low speed and the reverse through gears. Three-speed planetary transmissions are also made, but are not often used.

The individual clutch system is somewhat similar to the sliding gear system, in that there are two parallel shafts carrying different sized gears; but in the individual clutch system the gears are constantly in mesh, and when it is desired to make use of any particular gear, that gear is clamped to its shaft by its individual clutch; hence the name of the system.

Friction transmissions, to which cosniderable attention has been given of late, consist essentially of driving and driven friction disks, the driven disk rolling on its edge on the driving disk. The driven disk is movable across the face of the driving disk, and the nearer it is moved to the center of the driving disk the slower it will be rotated. When moved across the central point the direction of rotation will be reversed. A considerable number of speeds can be obtained by this method. Early attempts tc make use of the friction drive were unsuccessful, but later experiments have resulted so well that cars are now on the market using the friction transmission with success.

The Sliding Gear Transmission in Detail.

The sliding gear transmission being so widely used, we will take it up first for a detailed examination. An explanation of the construction of a typical sliding gear transmission will enable the reader to get a clear understanding of the variations adopted in different cars.

Referring to the accompanying drawing, it will be seen that there are two parallel shafts, each with gears mounted upon it. Shaft *A* in the drawing is called the primary shaft and shaft *B* is known as the secondary shaft, the lay shaft or, sometimes, as the countershaft. A considerable part of the length of the primary shaft is square in section, and upon this squared part slides a hub *C* carrying two gears of different diameters. The small gear is usually formed integral with the hub, while the large one is bolted to a flange which is an integral part of the hub. Between the gears are two flanges or collars forming a groove; a fork, similar to the fork used for operating a clutch, projects into the groove. The fork being connected with a lever within convenient reach of the driver of the car, the sliding gears can be moved to any point on the squared part of the primary shaft.

It will be noticed that on the left hand end of the primary shaft, which is the end nearest the engine, there is a sleeve *D* whose outer end carries a flange, while the inner end carries a small gear or, correctly speaking, a pinion, *E*. (When two gears of different sizes work together the smaller is called the pinion and the larger the gear.) The pinion on the sleeve meshes with a gear *F* on the secondary shaft *B;* these two are always in mesh, being fixed on their respective shafts. Two other gears, *G* and *H*, are fixed on the secondary shaft, as the drawing shows.

The sleeve *D* on the primary shaft is driven direct from the clutch shaft through the flange; but the sleeve turns easily on shaft *A*, the end of which projects into the sleeve as shown at *I* where the sleeve forms a bearing for the shaft. Thus the sleeve does not drive the shaft direct. The pinion *E* of course turns with the sleeve, to which it is fixed, and so drives the lay shaft *B* and its gears *G* and *H*. Whenever the engine is running with the clutch engaged, the sleeve, its pinion and the lay shaft and its gears must rotate. But the only connection with the rear wheels is through the primary shaft *A*, the rear end of which is coupled at *J* to the shaft, by which motion is imparted to the rear wheels. So there must be some connection between the secondary shaft and the primary shaft in order to drive the rear wheels, and this is furnished by the pair of sliding gears on the squared part of the primary shaft. In the engraving the sliding gears are shown in the position to give the slowest forward speed, and the drive is as follows:

Following the Course of the Drive.

From the sleeve *D* and its pinion *E* to the gear *F* on the secondary shaft; from the smallest gear *H* on the secondary shaft to the large gear *K* of the sliding pair, which causes the primary shaft to turn, and from the rear end of the primary shaft to the connections with the rear wheels. It will be seen that there are two reductions of rotative speed; pinion *E* on the sleeve is smaller than gear *F* on the secondary shaft, which revolves more slowly than the sleeve, and gear *H* on the secondary shaft is smaller than gear *K* on the primary shaft, so that the primary shaft moves slower than the secondary. Suppose, however, that the sliding pair is shifted to the left—forward—by means of the lever and fork. First the large gear *K* will slide out of mesh with the pinion *H* on the countershaft, when the gears will be in what is called a neutral position, the primary shaft not being driven. Continuing the movement in the same direction, the smaller gear *L* of the sliding pair slides into mesh with the second gear *G* on the secondary shaft. The two gears now in mesh are of the same diameter, so that both shafts rotate at the same speed instead of the primary shaft moving more slowly than the secondary. The speed of the car is thus increased just so much. This is the second or intermediate speed.

Direct Drive on the High Speed.

Third speed, which in this case is the highest speed, gives a direct drive—that is, drive from the engine through the transmission is effected without driving through any gears. By examining the drawing it will be seen that a number of teeth *M*, projecting forward, are formed on the sliding hub, and that there are corresponding teeth *N*, pointing backward, formed on the driving sleeve, the teeth forming what is called a claw clutch. Now, if the movement of the sliding gears is continued still further, they will slide out of mesh into another neutral point, and then the claw clutch referred to will lock together, causing the primary shaft to rotate with the sleeve. The spaces between the gears are so laid out that when the direct drive is engaged the intermediate gear *G* on the secondary shaft will be between the two gears of the sliding pair, meshing with neither. There is no means for unmeshing the gears by which the secondary shaft is driven from the sleeve, but as the secondary shaft runs idle there is no wear to speak of, and if the gears are well cut and the lubrication good the noise made by the idle shaft and gears is practically nil.

Arrangement of the Reversing Gears.

In order to avoid confusion, no reference has yet been made to the reverse or the manner in which it is obtained. The reverse is obtained by the use of a second countershaft, a very small one, carrying two pinions. Part of the reverse shaft and of one pinion are shown at *O*. These are so placed that one of its pinions is in mesh with the low-speed gear *H* of the secondary shaft, while the other is so placed that when the sliding gears are moved backward from the position shown in the drawing, the large gear *K* of the sliding pair will engage with the second pinion *O* on the reverse countershaft. This reverses the direction of rotation of the primary shaft *A* and gives the car a slow speed backward.

Sliding gear transmissions often differ in detail from the one here illustrated. Some makers seek to avoid running the secondary shaft idle while the direct drive is in use, and this is accomplished by having a small arm and fork, or an equivalent device, to move the driven gear of the secondary shaft out of mesh with the sleeve pinion when the claw clutch is moved into engagement. There are other ways of accomplishing the same end, but this one will serve as an illustration. The sleeve on the forward end of the primary shaft may be replaced by a shaft telescoping into the squared primary shaft, or it may run clear through the primary shaft to give stiffness and a good bearing. The addition of gears, suitably arranged, will give additional speeds, though there are rarely more than four speeds. Owing to the many bearings, the gears and the heavy stresses imposed upon the transmission generally, it must be very carefully constructed in order to absorb in friction the least possible power; recently ball bearings have come into use for transmission shaft bearings, and by this means friction losses are considerably reduced.

SUMMER ACTIVITIES AMONG THE CLUBS.

Clevelanders Erect Signboards in Northern Ohio.

CLEVELAND, O., July 9.—Signboards showing the distances between towns and danger points along the main east and west highway across the greater portion of northern Ohio are being erected by the Cleveland Automobile Club, under the direction of Secretary Asa Goddard, who, accompanied by three assistants, has made the trip from Cleveland to Fremont in a 45-horsepower Stearns car, erecting signs on this division of the through route.

PUTTING UP THE SIGNS.

Leading out of Cleveland, the signboard committee decided not to follow the old route directly out Detroit street, but took the new road out Clifton Boulevard, a beautiful paved thoroughfare leading to Rocky River, thus giving tourists a chance to see one of the city's finest boulevards. Crossing the high level bridge at Rocky River, the road turns to the left, and from there on to the county line there is one of the new paved pikes which is making Cuyahoga county famous among Ohio counties as an advocate of fine country roads. Within the past year or so nearly every leading highway out of Cleveland has been improved by a strip of ten feet of smooth brick pavement with improved gravel roads at the side.

Secretary Goddard, who was formerly a good road engineer in the East, is much impressed with the magnificent work being done in Cuyahoga county, although he thinks that a macadam road is less expensive and more serviceable. Going on to Elyria, there is a good gravel road which is well kept, but very dusty at this time of the year. From Elyria to Norwalk there is a stretch of twenty-six miles where the traveling is slow in many cases on account of deep sand. Beyond Norwalk to Monroeville there are numerous twists and turns and guide boards were erected at frequent intervals. At Monroeville the road runs into the old Perrysburg pike, which was a government road in the early days. This pike is 160 feet wide and originally it was macadamized, but has grown rough and full of "chuck" holes, which makes driving dangerous. Through Huron county a considerable amount of road improvement work has been done and there are stretches of two or three miles in a number of places where a strip ten feet wide has been built of crushed rock and fine stone, making a very substantial road. Unfortunately, however, the road builders did not use heavy rollers to make a solid foundation before the road was used, and as a result deep ruts are worn in many places by the wheels. Still the stretches of this road are a great improvement over the sand and clay road usually found in this district.

The Cleveland Automobile Club is considering the advisability of holding another race meet this summer, about the third week in August. If the meet is held, it will be for standard stock cars, with no special events for racing machines. One of the events under consideration is a 24-hour or a 1,000-mile endurance contest. The committee in charge will hold a meeting some time this week and will decide what sort of a meet to hold, if any.

Detroit A. C. Has Successful 100-Mile Run.

DETROIT, MICH., July 9.—With a total of 11 perfect scores out of 21 starters, the recent road run under the auspices of the Automobile Club of Detroit proved a pronounced success. The route was from this city to the clubhouse at Pine Lake, a roundabout course being taken to make it as near a century run as possible, the actual distance being 99 miles. The contestants were divided into three classes, one for drivers of machines costing $2,500 and upwards; the second, $1,000 to $2,500; the third, $1,000 and less. Although there was a schedule calling for certain time on each control, deductions were made for failure to cover the distance within the prescribed period, with a doubled loss of points for exceeding the speed limit fixed, the event being a race, pure and simple, with the winners entitled to all the honors achieved.

Edwin S. George, in a Packard, was the first to arrive at the clubhouse, his running time, after having loafed an hour at the various controls, being exactly 3:35, thus making a perfect score. C. A. DuCharme, also with a Packard, came in second. The third man in was C. H. Hecker, in a Packard, but he was penalized one and one-half points for miscalculating the running time and finishing a minute and one-half late. Those whose names will be engraved on the cup offered in each class are:

Class 1—Edwin S. George, C. A. DuCharme, Sherman L. Depew, all Packards; Gilbert W. Lee, Peerless; A. R. Welch, Welch; J. W. Thompson, White.

Class 2—John P. Schneider, C. B. Davis, Olds; E. D. Emmons, Buick; E. B. Finch, Pungs-Finch.

Class 3—Harry Skillman, Ford.

So well pleased were the club members with the run that others over the same course are being planned.

Put the Darien, Conn., Constable Out of Business.

NORWALK, CONN., July 9.—For the past two Sundays business has been poor with the constables of Darien, Conn., owing to the fact that the Norwalk Automobile Club has been placing a man at each end of the trap to warn all approaching automobilists of

A STOP FOR REPAIRS IN NORTHERN OHIO.

the danger they incur of being haled before the local Dogberry. The warning signal consists of a red flag bearing the club initials, "N. A. C.," in large letters on it. The Norwalk Automobile Club desires to warn all automobilists of the danger through the columns of THE AUTOMOBILE, and asks them to look out for the signal, as it is for their own good and will save them money.

Seattleites Prepare for an Active Season.

SEATTLE, WASH., July 5.—The Seattle Automobile Club is preparing for a very busy season. At its semi-annual meeting it decided to hold two runs, one to Paradise Valley, up in the mountain, and the other to Vancouver Island. To reach the latter place it will be necessary to ship the cars to Victoria, from where the roads are the best in this section of the country. The club also appointed a committee to confer with the city council of West Seattle relative to the planks that have recently been placed across the board road leading to that place. One of the county commissioners had them placed so as to reduce the speed of automobiles.

During the present season the club will have permanent quarters over the Independent Garage, on Broadway. It is also proposed to have a country home, but further consideration of that project will be taken up at a later meeting. Several sites are being considered.

No Race Meet at Minneapolis in August.

MINNEAPOLIS, MINN., July 7.—There will be no automobile races held here during the G. A. R. encampment week in August. This was decided at a recent meeting of the trustees of the Minneapolis Automobile Club, and the reason given is lack of a suitable track for the purpose. It was first planned to hold the races at Lake Harriet, but the park board refused to build a speedway around the lake. Next the club was turned down by the State Fair Association when it asked for the use of Hamline track for the contests, the officials of the fair association claiming that the autos would spoil the track for horse racing purposes.

A special committee composed of two non-members of the club and one club member has been selected to solicit funds to keep the roads in and about Minneapolis in repair. Many offers of assistance have been received in sums ranging from $50 to $500 for the purpose.

Hermitage Club Opens and Elects Officers.

WORCESTER, MASS., July 9.—The only country club in this country, if not in the world, whose membership list contains only the names of automobile owners, the Hermitage Country Club, on the famous estate of that name, just outside of Worcester, was opened last week, about 100 members, men prominent in automobiling circles in New England, being present. The Hermitage and vista were thrown open and inspected, and at the stag dinner in the evening the following permament officers were elected: President, J. A. Rumrill, Springfield; vice-presidents, Quincy Adams Shaw, Jr., of Boston, and Chester W. Bliss, of Springfield; secretary, George A. Beals, of Boston; treasurer, Irving Swan Brown, of Worcester. The estate contains 275 acres of wooded park land that its late owner intended to convert into a second Lenox, but his death intervened.

Chicago A. C. Will Help Dealers' Association Run.

CHICAGO, July 9.—At a meeting of the runs and tours committee of the Chicago Automobile Club, it was decided to join hands with the Chicago Automobile Dealers' Association in the 100-mile endurance contest over the Elgin-Aurora course, which is scheduled for July 30. The next regular club run, July 13-14, will be to Lake Zurich. Saturday night will be spent at the lake and the return trip will be made Sunday.

The second celebration of Orphans' Day in Chicago, under the combined auspices of the Chicago Automobile Dealers' Association and the Chicago Automobile Club, June 26, was a gratifying success in every way. There were 98 cars and 2 big trucks in line, and over 1,000 children were entertained with an afternoon outing.

CLUB DOINGS IN GENERAL.

ROCKFORD, Ill.—A dinner was given by the Rockford Automobile Club on the evening June 30 in honor of President John Farson and Secretary Sidney S. Gorham, of the American Automobile Association, who, with a party of friends, made the trip from Chicago to this city in automobiles. Addresses were made by the guests of honor and prominent local automobilists.

BINGHAMTON, N. Y.—At the last meeting of the Binghamton Automobile Club, two dates were set for Children's Days, July 10 and 12, on which dates the inmates of the Susquehanna Valley Home and St. Mary's Home will be given free outings. Fifty-two automobiles were offered at the meeting for the use of the children. The affair promises to be a great success.

NEW YORK.—The house boat of the Motor Boat Club of America has been completely refitted and is now at its mooring in the Hudson River, foot of 112th street. The week of September 10 has been scheduled for the National Motor Boat Carnival, and it will be the gala week of the season. The club has a representative now in Europe in the person of Dr. Seymour Oppenheimer, the fleet surgeon, who is securing the entries of the marine flyers for the carnival.

KNOXVILLE, TENN.—Efforts are being made by local automobilists to revive interest in the Knoxville Automobile Club. While automobiling in general has increased steadily here, club life has been on the decline owing to the bad condition of the roads in and about the city. The past year the county has been improving the suburban roads and club runs will become a feature. There are over 80 machines in Knoxville and a strong club can be made out of the material now in sight.

KANSAS CITY, MO.—Secretary H. G. Blakeley of the Kansas City Automobile Club has been delegated to draw up a memorial for presentation to the next Missouri legislature, setting forth the sentiment of the club in favor of good roads legislation and advocating highway improvement in strong terms. The movement is the outcome of the recent discussion of the road question at the banquet of the club at the Midland Hotel in this city, at which time prominent men in city and state affairs expressed themselves favorably on the subject.

NEW YORK.—To the members of the Automobile Club of America special non-resident privileges have been accorded by the Automobile Club of Great Britain and Ireland, which has advised the A. C. A. that upon payment of the annual subscription of five guineas, full touring and customs privileges accorded the British club will be granted. Members desiring to go abroad may obtain the necessary credentials through Secretary Butler. The privileges of the Seawanhaka-Corinthian and the Manhasset Bay Yacht Clubs at Oyster Bay and Port Washington, L. I., respectively, have also been accorded the A. C. A. for the season of 1907.

TRYING OUT A CAR ON DEAD HORSE HILL, WORCESTER.

CONGRESSIONAL INTEREST IN ROADS.

WASHINGTON, D. C., July 9.—The closing hours of Congress were enlivened by a number of good roads speeches, in the course of which the necessity for government aid in improving the public highways was brought out in no uncertain manner. Representative Bankhead, of Alabama, in a very able address, declared that to his mind the condition of the wagon roads, over which 90 per cent. of all the commerce of the country is transported, presented a problem for legislation by Congress far more serious and important in its results than that of railroad regulation. There is no necessity, he said, for making an argument to prove the value of good roads. They save worry, waste and energy. They economize time, labor and money, and enhance the value of property. He pointed out that it has been estimated that every time the sun sets the American farmers have lost $1,500,000 because of the condition of the roads. Representative Bankhead produced a set of figures, showing the cost of hauling per ton, horsepower, over dirt roads five miles, was $1.25, and that sum will pay the freight for 250 miles on a railroad or 500 miles on a river and 1,000 miles on the lakes. These figures prove conclusively the enormous tax levied by the bad roads on the farmers, and how much of their legitimate profit is consumed in hauling from their farms to railroad stations and river landings.

The speaker declared that the question of governmental road construction had been successfully tried for many years in other countries.

Representative Lloyd began his speech by saying that he indorsed the statement of a prominent citizen who said that he could tell the intelligence and progress of the people by the condition of their roads. The wag on the streets said in reply: "Then judge our people when the weather is dry." He then went on to call attention to what the Federal Government has done, is doing, and what it may do to encourage road improvement. In his judgment the Bureau of Public Roads in the Department of Agriculture is one of the most important branches of public service, and from it incalculable benefit may come. This great service thus far has been somewhat overlooked, and its work has not been fully known or properly appreciated. One step in the onward movement to give the country better roads is to encourage the development of the road department of the Department of Agriculture by enlarging the scope of its labors, increasing its force of expert engineers and specialists and bringing it more in touch with the people, so that they can receive more of its benefit by practical demonstration of its real value.

SOME INTERESTING ROAD FIGURES.

Believing that improved highways are necessary for the continued prosperity of automobiling, the American Motor Car Manufacturers' Association will provide for a department having road matters in charge. Information received at the headquarters this week from Logan Waller Page, director of the United States Department of Agriculture, gives some interesting figures of the amount of new roads which have been recently built, together with the total number of miles. The major portion of the states have less than 10 per cent. of their roads improved, a wretched showing for a civilized country.

Tennessee has 48,989 miles of public roads, or one mile for every 41 inhabitants, of which only about 9 per cent. has been improved. Virginia has 51,812 miles, of which 1,600 miles are improved, giving but one mile of improved roads to every 1,158 inhabitants; North Carolina has 49,763 miles; Oregon, 34,258 miles; Iowa, 102,488 miles; Arkansas, 36,445 miles; Arizona, 5,987 miles; Alabama, 50,089 miles; Washington, 31,998 miles; New Hampshire, 15,166 miles. In most of these states there is one mile of ordinary road for every 25 to 35 inhabitants, but of improved roads, only one mile for anywhere from 471 to 1,255 inhabitants, a discouragingly small proportion.

MR. THOMAS' GOOD SUGGESTIONS.

In a recent interview E. R. Thomas, of the E. R. Thomas Motor Company, of Buffalo, scores some pertinent points regarding the reckless chauffeur and the tendencies prevalent to a betterment of professional drivers as a class. He also makes some pithy suggestions regarding street traffic, thusly:

"Happily a greater number of sober and reliable men are now engaged in the respectable calling of chauffeur, and the morals of this class are improving fast, and the day of the unreliable criminal will rapidly become a thing of the past. In New York and the East the improvement is noticeable and the large number of respectable chauffeurs owe it to themselves to eliminate this dangerous and degrading class from their ranks; for no man should ever be permitted to drive a car who is not strictly temperate and reliable.

"Street traffic in the large cities is becoming so congested that the laws should be revised so as to confine the faster vehicles to the center of the streets or next to street car tracks and the slower vehicles to nearer curbstones. Bicyclists should not be permitted to ride abreast nor in the middle of the proper side of the street, practically rendering it impossible for a vehicle to pass them without crossing the street. Pedestrians should not be permitted to blockade or stand in the middle of either side of the street."

ROADS ROUNDABOUT SPOKANE.

SPOKANE, WASH., July 5.—Strong talk is being heard among persons in this state in favor of drafting a more specific law limiting the speed of automobiles on country roads. Unless lovers of the sport look to their own interests a law is apt to be passed which will do them an injustice in this particular.

One of the best automobile roads on the Pacific coast is the run out from Spokane on the Sprague avenue road to Cœur d'Alene, Hayden lake and other delightful resorts east of the city, some of them over the line in Idaho. The grades are trifling, the road is broad and on a gravel bed almost as smooth as a macadamized road, has but little dust in dry weather and is not muddy after a rain.

One of the big touring cars of the Hunt Manufacturing Company met with a peculiar accident near Connell, Wash., a few days ago. The machine was being driven over strawed roads, when it began to roll up straw until it threatened to clog the machinery. While the driver was endeavoring to remove the straw it took fire and the machine and straw road both were badly burned. The damage is estimated at $3,000. In some localities in this part of the country the farmers cover the road with straw, which makes a good road bed for both teaming and the auto.

ON THE HEIGHTS ABOVE THE SPOKANE RIVER.

The picture shows Dr. C. P. Thomas, of Spokane, Wash., alongside his Franklin Car, overlooking the beautiful river of that name. The doctor is a prominent member of the American Medical Association, and a frequent contributor to medical journals on automobile subjects.

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The Prevalence of Orphans' Days. What may be termed a rising tide of public sentiment among automobilists is manifesting itself strongly this year, and redounding to the benefit of the orphan children of the country at large. Stirred by feelings of philanthropy, and by the success of Orphans' Days in the great cities, where the public press has been unanimous in its praise of the movement, automobile clubs and local trade organizations are now arranging for outings for the little unfortunates in almost every section of the country. It has become the fashion to do good for the parentless little ones, and the world will be better for it in the years to come. It strikes us that the recording angel will charitably forget to mark down all of the shortcomings of the man who loans his car for an orphans' outing. May the popularity of Orphans' Days never grow less.

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Deductions of an Agricultural College. And now comes the announcement from that seat of intellectual development, an agricultural college in New Hampshire, that the automobile is responsible for the introduction of that enemy of shade trees, the gypsy moth, into that fair state. This is, indeed, information of great importance. The report states that the infestation of moths has been along the main roads leading from the infected regions of Massachusetts; therefore it must be the automobile that is responsible. Of course, an agricultural college would never be guilty of the presumption that a horse-propelled vehicle could carry a brood of gypsy moths across the state line. That would be at variance with the creed of the agriculturist, therefore an impossibility. One can picture the Glidden tourists all in line, within the next few weeks entering New Hampshire en route for the White Mountains, their cars filled with choice broods of gypsy moths bent on destruction, for the agricultural college has spoken, and the sinister automobilist is in league with the fell destroyer of New Hampshire's peace of mind. Some time in the not far distant future the intelligent public will wonder how it ever listened with patience to the ridiculous and visionary sophistries of the critics of the automobile. The foregoing criticism is so absurd that it is unworthy of serious comment.

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Why Change-Speed Gears Are Required. To the novice probably the most puzzling thing about a gasoline car is the need of a change-speed gear. He is most likely to make a mental comparison between the automobile and the railroad locomotive, with which he is familiar, and to wonder why the one has gears and the other has not. In this issue we publish an article on the functions of the sliding gear type of change-speed gear, for the information of the beginner, so a knowledge of that particular type may be assumed. This may be supplemented, however, by a little consideration of the underlying reasons why a change-speed gear is necessary at all.

In the locomotive the capacity of the boiler to generate steam (energy) is in excess of the quantity used by the engine, and it follows that the maximum pressure can be maintained irrespective of the speed of the locomotive. When it is so desired the valves that control the supply of steam from the boiler to the cylinder can be arranged so that the full boiler pressure (available energy) can be exerted on the piston for almost the entire length of the stroke. The turning effort on the crank (torque) will therefore be maximum at the lowest speed of rotation, as when starting up or when climbing a grade.

In the gasoline motor the energy contained in the "mixture" is liberated only upon explosion, so that the greater the number of explosions in a given time, say a minute, the greater the power developed by the motor and *vice versa*. There is no storehouse of energy to draw upon, as in the locomotive boiler, though there is a certain amount of energy stored up in the mass of the flywheel *after* it is set in motion by the motor, but not before. This is familiarly useful in overcoming the inertia of a car when starting.

Now, suppose a car to be running upon a level stretch, with the engine turning at the maximum number of revolutions and driving "direct," should any increased resistance to motion be encountered, such as a hill, the engine will slow down, for manifestly there is not any more power available to overcome the increased resistance. As the motor slows down the number of explosions per minute will decrease in proportion and consequently the available amount of energy will be lessened. It is easy to imagine an increase of resistance to the extent of stopping the motor altogether—as on a very steep hill. But if, instead of having the motor directly connected to the driving wheels, we interpose change-speed gears, so that the motor will be obliged to turn a greater number of revolutions to one revolution of the road wheels, we shall get more explosions per minute; or say as many at the decreased speed of the car as we got at the higher speed without the use of gears—or direct drive. We have not increased the available supply of energy at all, however; we are simply doing a greater amount of work and doing it in a longer time than before the change of speed was made, and so absorbing a similar amount of power to that used in doing the lesser amount of work in a shorter time—as when driving on the level.

Many drivers will refer to speed-changing (down) as getting "more power," while in reality they may be getting less at the rims of the road "driving" wheels owing to the increased mechanical losses due to the use of the change-speed gears or indirect drive.

THE GRAND PRIX OF 1907.

PARIS, July 2.—No sooner is the Grand Prix won and lost than the question is asked, What will be the speed test next year? There is some dissatisfaction with the present regulation limiting the weight of cars to 1,000 kilos, and it is proposed to substitute for this a limited piston surface, a bore of 150 millimeters for four cylinders being the limit proposed.

Most of the manufacturers likely to be affected by such a radical change declare the matter too important to be pronounced upon without serious consideration. The Renault Frères are hardly favorable to the change; M. Brasier refuses to express an opinion; M. René de Knyff says that if the question comes before the Sporting Commission it will be carefully considered, and Monsieur Clément states that he is favorable to the change. At the same time the well-known constructor is of opinion that 150 millimeters for four cylinders is not sufficient, and asks what would be done in case a six-cylinder car were entered. It is no secret that for some time past tests have been made with six-cylinder motors at the Bayard-Clément factory, and the first racer of this type will probably be seen in the Vanderbilt Cup contest.

FEW AMERICANS AT THE GRAND PRIX.

There was a paucity of Americans at the Grand Prix and few English. Elliott F. Shepard, driving a Hotchkiss excellently on the first day, and going to the bad on the second day through the use of weak wire wheels, was the solitary American participant, except indirectly Robert Graves, who mournfully watched poor Jenatzy contend against tire troubles that were not mitigated by the use on the Mercedes of the patent rim. It might be mentioned that Mr. Graves' car will have the rim in the Vanderbilt race. Foxhall Keene was a nonchalant observer the first day, but did not return for the conclusion. H. A. Lozier, Jr., touring France with Mrs. Lozier, stopped at Le Mans for the race; Cortlandt Field Bishop, of auto and aeronautical fame, was in evidence; Richard Haden Hood, an American on a prolonged European automobile tour with Mrs. Hood, was about, as were Mr. and Mrs. C. B. Harmon, also New Yorkers.

Well known international figures in the trade were numerous, including A. de Magnin, Panhard; Baron de Turckheim, de Dietrich; Paul Lacroix, who will be in America soon in Renault interests; Henry Fournier, now of Itala connections, who will come over for the American shows; C. L. Charley, the Mercedes exploiter; Albert Clément, and many others equally prominent. Count de la Vaulx, the balloonist, was also in view.

THE PATENT RIMS IN THE RACE.

One of the features of the Grand Prix was the presence of patent mobile rims, and it is only necessary to point out that a saving of at least 50 per cent. was effected in the changing of tires. The first, second, third, and fifth arrivals were all fitted with these rims. Szisz, the winner of the race, changed tires nineteen times during the twelve rounds, the time for each change being about five minutes. With ordinary rims ten to fifteen minutes would have been necessary.

No sooner was the contest over than a dispute arose in regard to the patent rights in the mobile rims, M. Vinet, the inventor of the rims, causing the Renault racer to be seized on the ground that the Michelin firm had no right to sell these rims. A lawsuit between M. Vinet and M. Michelin is likely to be brought about. There are two kinds of rims, alike in principle, differing only in detail. The one is known as the Vinet and has recently been put on the French market by M. Kepferer, of Rue de la Rochefoucauld, Paris, and the other, the M. L., is handled by the M. L. Company, Rue de Richelieu, Paris. The rims used on the Renault car were supplied by M. Michelin, by agreement with the M. L. Co.

OPEN-AIR GARAGE AT THE GRAND PRIX.

THAT COUP INTERNATIONALE REVIVAL.

LE MANS, June 26.—On the eve of the Grand Prix a meeting was held to discuss the proposals of the Automobile Club of Great Britain and Ireland, relative to the future of the Coup Internationale, or Gordon Bennett race. France, England, Germany, Austria, Italy, Sweden, Belgium, and America were represented at the conference. As had been expected, strong opposition was shown by France toward the proposals,

SHEPARD ON HOTCHKISS PASSING THROUGH CONNERE.

largely on the ground of expense. With the exception of England and America, all the nations represented were in favor of allowing the Cup to lie dormant; even the British delegates were not adverse to this, providing an assurance were given that the Cup should not be entirely forgotten. After much discussion, during which the French club offered to hand the Cup over to any nation desirous of organizing the event, it was decided to postpone all movement until the annual meeting of automobile clubs in Paris next December.

NAZZARO ON FIAT CROSSING BRIDGE AT CONNERE.

THE LIFE OF FRANCOIS SZISZ.

Szisz, the Grand Prix winner, is of Hungarian origin, being born in Vienna 33 years ago. At an early age he gave himself up to mechanics, only leaving the workshop to fulfill his military service in the cavalry. After working in several towns in central Europe as a fitter, he came to Paris in June, 1899, and entered a machine tool shop. The following May he entered the Renault factory, at Brittancourt, as an adjuster, but was so little impressed with the importance of the firm that he mentally resolved not to stay more than a week—the factory at that time being nothing more than a shed.

At the end of the week Szisz had become smitten with the automobile fever and decided to remain with the firm. The same year he was employed as a workman in the preparations for the Paris-Toulouse race. In September, 1900, he was installed as chauffeur on a small car with an electric searchlight, supplied by Louis Renault to General Brugère. At the Paris-Bordeaux race of 1901, the Paris-Berlin of 1901 and the alcohol test of 1902, in all of which Louis Renault was engaged, Szisz was present as one of the repair crew. In 1902 Louis Renault turned his attention to light cars, and, needing a mechanic who spoke German, took Szisz. Paris-Vienna and Paris-Madrid were run; then for two years after the fatal accident to Marcel Renault, the firm remained out of all races.

In the meantime the wooden shed had given place to a large factory, and the vegetable garden round the works had to make way for a thriving town. Last year it was decided to compete in the Gordon Bennett race on the Auvergne circuit, and as Louis Renault had abandoned road racing the Renault car was entrusted to Szisz. The motor heated a little and success did not crown Szisz's efforts; nor was he more successful in his second attempt last year in the Vanderbilt Cup race.

When he started in the Grand Prix race, Szisz says he was full of confidence, for his machine only a few days before had covered 400 miles at an average speed of 71 miles an hour. Only his tires caused him anxiety, owing to the bad condition of the road, and he felt somewhat handicapped in only having patent rims on his rear wheels. Excepting the changing of a sparking plug at the beginning of the race, Szisz had no trouble whatever with his car. On the second round a rear tire burst and he was passed by Baras. Near the end of this round Szisz took the lead, but only learned his position when he stopped at the repair station on his fourth round.

Excepting tire changes nothing further happened to the racer during the end of the day; but when the first half of the race was won Szisz was seized with a fit of despair, for his eyesight had been so terribly injured that he could hardly see. Under treatment they improved somewhat.

The Man Who Designed the Car.

Louis Renault, the designer of the winning car, is a Parisian, twenty-nine years of age. At school he was an indifferent pupil, and when he left college had not won the degree of bachelier, so much coveted by French youths. Refusing to enter his father's drapery business, Louis in 1896 accepted a position as draughtsman with the Delaunay-Belleville firm, then occupied with the construction of railway material. In 1897 he applied for a position in the Panhard & Levassor factory, but was bluntly informed by M. Levassor that they wanted no amateurs. Louis Renault went home, and, his mother providing the necessary funds, opened a small workshop, where he constructed a light car. In 1899 he won the Paris-Rambouillet, Paris-Trouville, and Paris-Ostend races with his first automobile, a small machine with a 2 3-4-horsepower De Dion motor. Success was immediately assured, and from 1899 to the present year the Renault factory underwent a series of enlargements until it has become to-day one of the largest in France.

FRENCH ENTRIES FOR VANDERBILT.

Chairman Jefferson de Mont Thompson, of the Vanderbilt Cup Commission, now in Paris, cables that the five French entries for the Vanderbilt Cup will be as follows:

100-horsepower Darracq, Hemery, winner of the 1905 race, driving.

130-horsepower Panhard, George Heath, winner of the 1904 race, driving.

125-horsepower Clément-Bayard, Albert Clément, second in the 1904 race, driving.

135-horsepower Hotchkiss, E. F. Shepard, an American, driving.

120-horsepower de Dietrich, Duray driving.

Chairman Thompson was deluged with French entries, the Darracq, Panhard, Clément, and de Dietrich all desiring to enter two cars each. The Renault Company, from a business standpoint, did not consider it advisable to send Szisz, the Grand Prix winner, who will be remembered as a participant in last year's Vanderbilt race.

PERCY PIERCE HOME FROM EUROPE.

Percy F. Pierce, who with his 45-horsepower Pierce Great Arrow competed in the Herkomer contest in Germany, arrived on the steamship *Majestic* on July 5, and went immediately to Buffalo, where he commenced his preparations for defending the Glidden touring trophy won by him last year. Mr. Pierce expressed the belief that foreigners were much too heavily handicapped to have any chance of winning in the Herkomer contest. Speaking of the collision incident, Mr. Pierce said it cost him $750 to get out of a scrape that was wholly due to the fact that the driver of the cart was drunk and sound asleep, only woke up when the car was about to pass, and then pulled the wagon directly across the road. The Pierce car got the worst of the encounter.

WHITE MOUNTAIN HILL CLIMB.

Up the three-and-a-half mile grade through Crawford Notch, June 30, the third annual White Mountain hill climb will take place, the start being made in front of the Wiley House and the finish at the Crawford House. Entry blanks were issued last week by Manager W. J. Morgan, in which twelve classes are scheduled as follows:

First—Free-for-all-class, including racing and stripped cars.
Second—Stock cars costing $850 or under.
Third—Stock cars costing over $850 and not more than $1,250.
Fourth—Stock cars costing over $1,250 and not more than $1,750.
Fifth—Stock cars costing over $1,750 and not more than $2,250.
Sixth—Stock cars costing over $2,250 and not more than $3,000.
Seventh—Stock cars costing over $3,000 and not more than $4,000.
Eighth—Stock cars costing over $4,000 and not more than $5,000.
Ninth—Stock cars costing over $5,000 and not more than $8,000.
Tenth—All stock cars over $8,000.
Eleventh—Lightweight class, 551 to 881 pounds.
Twelfth—Heavyweight class, 1,432 to 2,204 pounds.

The entrance fee for the climb is $10, but participants in the annual Bay State Automobile Association's run to the White Mountains, which will meet the Glidden tourists at Bretton Woods, N. H., however, may enter the climb free. The New York Motor Club and Long Island Automobile Club are co-operating with the Bostonians in the tour.

The New York touring party will leave this city at 10 a.m. on July 24 from the New York Motor Club's Headquarters, Hotel Cumberland, Fifty-fourth street and Broadway, and will tour to Boston, stopping at Waterbury on the night of the 24th, arriving at Boston on the evening of the 25th.

On the morning of the 26th the Bay State Automobile Association will take charge and the tour will proceed to Newcastle, where the rest of the day will be spent in games. The next morning, July 27, the party will go to Bretton Woods to meet the Glidden trophy touring party of the A. A. A. on July 28. Sunday, July 29, will be spent at Bretton Woods. Monday, July 30, the hill climb will take place, entries for which will close July 20, with W. J. Morgan, Bretton Hall, 86th street and Broadway, New York.

ALL READY FOR THE GLIDDEN TOUR

BUFFALO, July 10.—The third annual tour of the American Automobile Association (Glidden and Deming trophy contests) started on July 5, from Chicago, six machines leaving the Auditorium Annex on that date and running on Thursday to Goshen, Ind., on Friday from Goshen to Toledo and on Saturday from Toledo to Cleveland. There the machines remained until Monday, running in two stages from Cleveland to Buffalo.

THE PAUL H. DEMING TROPHY.

The first cars arrived in Buffalo, the starting point of the Glidden tour, Saturday night at 7 o'clock. Both were Pierce Great Arrows, driven by C. Henry Fosgate, of Quincy, Ill., and H. Paulman, of Chicago. They were met at the Iroquois Hotel by members of the Automobile Club of Buffalo.

On Sunday morning there were four other arrivals from Chicago: No. 1, N. H. Van Sicklen; No. 5, J. H. McDuffee; No. 6, Charles Y. Knight; and No. 19, Webb Jay. The committee of local automobilists have headquarters at the Iroquois Hotel for the reception of contestants.

The members of the Automobile Club of Buffalo are wide awake to the responsibilities resting upon them and upon the city, and elaborate arrangements have been made for the entertainment of visiting contestants. There are various entertainments planned for the four days preceding the start on Thursday, July 12. It was announced by Secretary Dai H. Lewis that the entertainment committee had bought 600 seats at Shea's Theater for the night preceding the start, and the local automobilists will entertain the visitors at a giant theater party. After the theater there will be a stag supper at the rooms of the Automobile Club in the Teck Theater Building.

The handsome bronze special trophy offered by Paul H. Deming, the chairman of the touring committee of the tourist section of the run, which was on exhibition here, has been shipped to Bretton Wood, N. H., the terminus of the run. This is a bronze statue of Mercury standing two and a half feet high, and will be awarded to the contestant not competing for the Glidden trophy who makes the best regular running record on the long tour. In addition to the entries already published, the following have been received, completing the entry list:

No. 49.—Charles L. Auger, Paterson, N. J. Saratoga to Bretton Woods. Will not contest for Glidden Trophy. Stevens-Duryea car of 20 horsepower. Automobile Club of America.

No. 50.—Maxwell S. Hart, care of Corbin Motor Vehicle Company, New Britain, Conn., Buffalo to Bretton Woods. Will contest for Glidden Trophy. Corbin car of 24 horsepower. Three to four in party. New Britain Automobile Club.

No. 51.—Ernest Keeler, care of Olds Motor Works, Lansing, Mich. Buffalo to Bretton Woods. Will contest for Glidden Trophy. Oldsmobile touring car of 28 to 30 horsepower. Four in party. American Automobile Association.

No. 52.—R. R. Owen, care of Olds Motor Works, Lansing, Mich. Buffalo to Bretton Woods. Will contest for Glidden Trophy. Oldsmobile touring car of 28 to 30 horsepower. Four in party. Cleveland Automobile Club.

No. 53.—Dexter Fairbank, 23 Scott street, Chicago, Ill. Buffalo to Bretton Woods. Will contest for Glidden Trophy. Cleveland car of 30 to 35 horsepower. Four in party. Cleveland Automobile Club.

No. 54.—W. L. Davis, 21 Marshall street, Hartford, Conn. Buffalo to Bretton Woods. Will contest for Glidden Trophy. Pope-Hartford car of 20 to 25 horsepower. Four in party. American Automobile Association.

No. 55.—W. A. Danzer, Hagerstown, Md. Buffalo to Bretton Woods. Will contest for Glidden Trophy. Crawford car of 24 to 28 horsepower. Four in party. Hagerstown Automobile Club.

No. 56.—Charles Schmidt, care of Peerless Motor Car Company, Cleveland, Ohio. Buffalo to Bretton Woods. Will contest for Glidden Trophy. Peerless car of 46 horsepower. Four in party. Cleveland Automobile Club.

No. 57.—Andrew A. Russell, care of Harrison Wagon Company, Grand Rapids, Mich. Buffalo to Bretton Woods. Will contest for Glidden Trophy. Harrison car of 40 horsepower. Four in party. Grand Rapids Automobile Club.

No. 58.—S. B. Stevens, Rome, N. Y., Buffalo to Bretton Woods. Will contest for Glidden Trophy. Darracq car of 40 to 60 horsepower. Four in party. Automobile Club of America.

No. 59.—John Banford, care of Olds Motor Works, Lansing, Mich. Buffalo to Bretton Woods. Will contest for Glidden Trophy. Oldsmobile touring car of 28 to 30 horsepower. Four in party. American Automobile Association.

No. 60.—Philip Corbin, Jr., care of Corbin Motor Vehicle Corporation, New Britain, Conn. Buffalo to Bretton Woods. Will contest for Glidden Trophy. Corbin car of 24 horsepower. Four or five in party. New Britain Automobile Club.

No. 61.—T. P. C. Forbes, care of Reo Motor Car Company, 40 West Sixtieth street, New York City. Buffalo to Bretton Woods. Will contest for Glidden Trophy. Reo car of 16 horsepower. Four in party. New York Motor Club.

No. 62.—E. R. Lozier, care of Lozier Motor Company, Fifty-fifth street and Broadway, New York City. Buffalo to Bretton Woods. Will contest for Glidden Trophy. Lozier car of 40 horsepower. Four in party. American Automobile Association.

No. 63.—J. H. Becker, care of Elmore Manufacturing Company, Clyde, O. Buffalo to Bretton Woods. Will contest for Glidden Trophy. Elmore car of 35 horsepower. Four in party. Cleveland Automobile Club.

No. 64.—Walter L. Marr, Jackson, Mich. Buffalo to Bretton Woods. Will contest for Glidden Trophy. Buick car of 30 to 35 horsepower. Four in party. American Automobile Association.

No. 65.—Theodore E. Schulz, One Hundred and Tenth street and Broadway, New York City. Buffalo to Bretton Woods. Will contest for Glidden Trophy. Marmon car of 30 horsepower. Four in party. American Automobile Association.

No. 66.—Frank E. Wing, 126 Columbus avenue, Boston, Mass. Buffalo to Bretton Woods. Will contest for Glidden Trophy. Marmon car of 30 horsepower. Four in party. Bay State Automobile Association.

No. 67.—H. K. Sheridan, care of White Sewing Machine Company, Cleveland, O. Buffalo to Bretton Woods. Will not contest for Glidden Trophy. White Steamer of 18 horsepower. Four in party. American Automobile Association.

No. 68.—L. E. Myers, Monadnock Building, Chicago, Ill. Chicago to Bretton Woods. Chicago Automobile Association.

No. 69.—Benjamin H. Knowles, 554 East Twenty-sixth street, Brooklyn, N. Y. Buffalo to Bretton Woods. Will contest for Glidden Trophy. Locomobile car of 30 to 35 horsepower. Four in party. American Automobile Association.

No. 70.—Palmer Abbott, New Orleans. Buffalo to Bretton Woods. Will contest for Glidden Trophy. Oldsmobile car of 28 to 30 horsepower. Four in party.

No. 79.—Packard Motor Company, Detroit, Mich. Packard car. Patrol car. Buffalo to Bretton Woods.

A late entry is that of Zalmon Pennock, of Elmhurst, L. I. Mr. Pennock will drive a 10-horsepower Cadillac and does not contest for the Glidden Trophy. He will join the tour at Saratoga and drive to Bretton Woods.

ADVANCE AGENT J. SCHREYER IN HIS MAXWELL.

CHICAGO'S TWO DAYS' MEET.

CHICAGO, July 9.—Some fast driving marked the automobile race meet held at the Hawthorne track July 3 and 4. On Tuesday Ollie Savin, driving a Thomas Flyer, broke the record for the fifty-mile race for touring cars over circular tracks, doing the distance in 1:06:19. The $1,000 offered by Edward Corrigan for the one who should do faster time at the Hawthorne track than has been made at Harlem, was won by Barney Oldfield, who went three miles in 3:06 in his Peerless *Green Dragon*. A. C. Webb, from scratch, won the Hawthorne handicap in a Premier car during the first day's contests. The fifty-mile endurance race was won by Ollie Savin, and W. W. McDonald, who drove a Columbia alone, was second. There were nine starters in this run and but four finished. Following are the first day's summaries:

INTERNATIONAL ENDURANCE DERBY, 100 MILES.

For touring cars with lamps, fenders and mufflers removed:
1. Thomas, 50 horsepower; driver, Ollie Savin, 1:06:19.
2. Columbia, 24 horsepower; driver, W. W. McDonald.
3. Mitchel, 30 horsepower; driver, C. Friend.

Other competitors were A. C. Webb, Apperson; George Crane, Knox; J. H. Osinga, Stevens-Duryea; F. Sweigert, Haynes; George Good, Thomas; and W. H. Hoops, Jr., Cadillac.

THREE MILES FOR CARS COSTING FROM $1,000 TO $2,000.

1. Buick, 22 horsepower; driver, W. R. Willett; 6:15.
(Friend, Rogers and Betts, all driving Mitchells, finished first, second and fourth, but were disqualified for having no fenders or mufflers.)

HAWTHORNE HANDICAP, FREE FOR ALL, 5 MILES.

1. Premier racer; driver, A. C. Webb (scratch); 5:38.
2. Thomas, 50 horsepower; driver, Ollie Savin (45 seconds).
3. Thomas, 50 horsepower; driver, Fred Good (1 minute).

Other competitors were: Jerry Ellis, Frayer-Miller (30 seconds); C. A. Coey, Thomas Tornado (scratch); W. N. Endicott, Moline (1 minute); H. W. Freeberg, Buick (15 seconds); H. B. Holmes, Maxwell (1 minute, 25 seconds); George Good, Thomas (45 seconds).

In the second day's races no records were smashed. In the 100-mile drive G. V. Rogers, in a 30-horsepower runabout, won after it looked as though he was badly beaten. When the race was three-quarters over he started in with a rush and gained the lead at the eightieth mile and never lost it, making the fair time of 2:25:21. Otis Friend was second and W. H. McDonald, who led from twenty-five miles to the eightieth, third. There was plenty of excitement during the day, H. W. Barnes running into the fence during one of the races and tearing a big section of it down. He himself escaped injury, although his car was badly smashed. This accident came in the Corrigan sweepstakes, and it was ordered to be run over again. C. A. Coey was making a runaway of the first race, but was badly beaten in the run-off, A. C. Webb holding the lead almost from the start. Summaries of second day's racing:

HAWTHORNE ENDURANCE DERBY, 100 MILES.

1. Mitchell runabout, 30 horsepower; driver, C. V. Rogers; 2:25:21.
2. Mitchell touring car, 30 horsepower; driver, Otis C. Friend.
3. Columbia, 24 horsepower; driver, W. W. McDonald.

THREE MILES FOR CARS COSTING $1,000 AND LESS.

1. Buick runabout, 22 horsepower; driver, W. R. Willett; 5:18 2-5.
2. Buick runabout, 22 horsepower; driver, A. D. Kennedy.

THREE MILES FOR CARS COSTING FROM $1,000 TO $2,000.

1. Mitchell touring car, 30 horsepower; driver, H. J. Meister; 4:58 1-5.
2. Buick runabout, 22 horsepower; driver, W. H. Willett.

THREE MILES FOR CARS COSTING $2,000 TO $3,000.

1. Stevens-Duryea; driver, J. H. Osinga; 4:30.
2. Royal, V. G. Williams.

CHICAGO DEALERS' HANDICAP, 5 MILES.

1. Moline, 20 horsepower; driver, W. N. Endicott; 1:10.
2. Thomas racing car Tornado; driver, C. A. Coey (scratch); 5:36.

CORRIGAN SWEEPSTAKES, 5 MILES.

1. Premier racer; driver, A. C. Webb; 5:55.
2. Thomas racing car Tornado; driver, C. A. Coey.
3. Buick; driver, H. W. Freeberg.

ILLINOIS SWEEPSTAKES, FINAL HEAT, 5 MILES.

1. Peerless "Green Dragon"; driver, Barney Oldfield; 5:27.

BIG CROWD AT MILWAUKEE MEET.

MILWAUKEE, WIS., July 9.—The second annual automobile race meet under the auspices of the Milwaukee Automobile Club was held in this city Saturday, and fully 10,000 people turned out to witness the performances. The weather for the races was ideal. E. H. Rogers, of Racine, Wis., in a Mitchell car, electrified the spectators by an exhibition of skill and daring in making the turns, and in a brilliant burst of speed dashed across the tape, completing fifty miles in 1:04:4-5, thereby breaking the record for fully equipped cars. Barney Oldfield, who drove Mayor Sherburn M. Becker's Pope-Toledo, took the lead and maintained it for 22 miles, but owing to a flat tire he was compelled to drop out for repairs. After a new tire had been placed on his machine Oldfield re-entered the contest, and although he had lost 11 laps during the course of the repairs he finished in third position. George Crane with a Knox car took second place.

The most hotly contested event on the program was the final heat of the Becker Invitation Sweepstakes, in which Barney Oldfield, after trailing behind Paul Albert for more than four and one-half miles, crept up on him and won by a nose at the tape. The qualifying heat for this event was also replete with unusual bursts of speed, Paul Albert in his White Streak defeating Dr. H. W. Freeberg in his Buick White Flyer only after being pressed to the limit, especially during the first two laps.

The first half of the five-mile event, which was open to cars listing from $2,000 to $3,000, was also productive of hair-raising dashes. Ed. Pyre, in a Buick, took the lead, but did not maintain it long, for Nelson, in a Pope-Hartford, followed him closely and led all the entries at the end of the first mile. After the third mile had been negotiated one car after another dropped out, leaving Clyde Leppo, who drove a Rambler, to finish alone, the time being 7 min..

CLIMB AT ATLANTIC HIGHLANDS.

Hill-climbing contests were the attraction at Atlantic Highlands, N. J., on the Glorious Fourth, the competition being held under the sanction of the A. A. A. There were three events, one for cars of 10-horsepower and under, one for cars of 25-horsepower and under, and the third a free-for-all. The hill, which is six-tenths of a mile long, was in rather poor condition owing to the heavy rains of the previous night, and the steep grade, together with the five sharp turns, made the climb a real test. The summaries:

Cars of 10 horsepower and under. Won by Chester A. Bentley's 10-horsepower Autocar. Time, 3:54. W. J. McClure's 10-horsepower Cadillac, second.

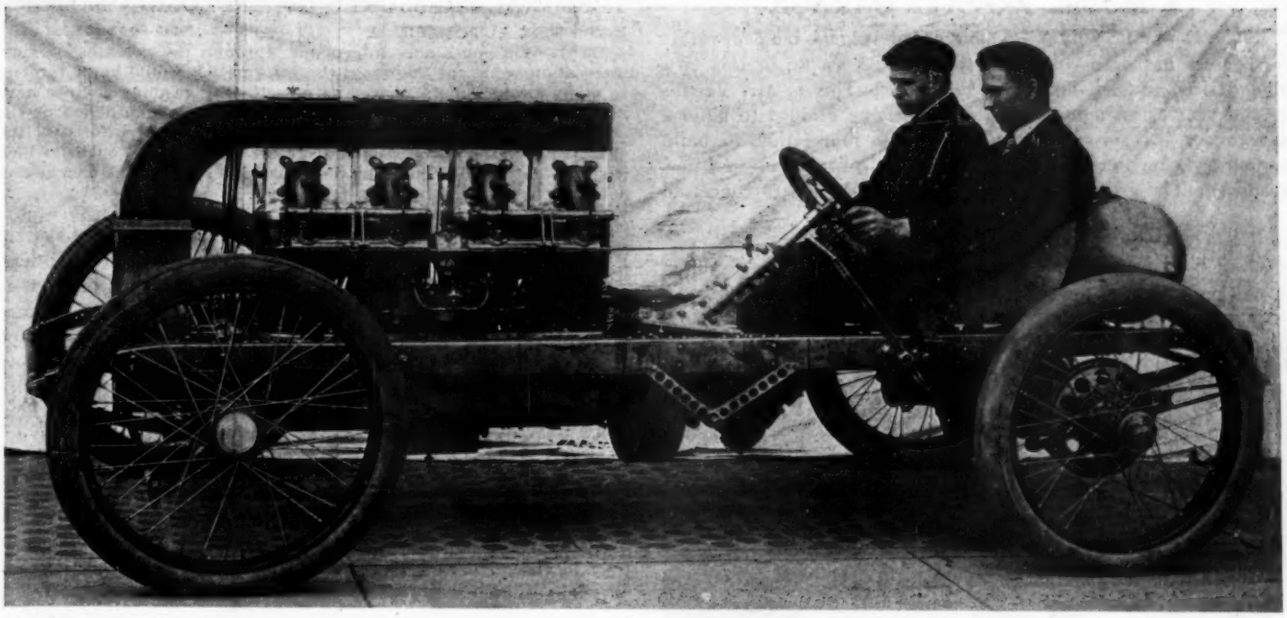
Cars of 25 horsepower or under. Won by H. J. Kohler's 22-horsepower Buick. Time, 1:21 3-4. James White's 24-horsepower Packard, second. Time, 1:34. C. B. Derby's 22-horsepower Buick, third. Time, 1:40.

Free for All. Won by H. J. Kohler's 22-horsepower Buick, after two trials. Time, 1:18 3-5. James White's 24-horsepower Packard, second. Time, 1:19. First trial resulted in a tie at 1:20 2-5.

AUTO RACE AT BALTIMORE ELKS' OUTING.

BALTIMORE, July 9.—There were two starters in the five-mile automobile race, which was a special event on the program of the Elks' outing at Electric Park last week. They were Arthur Stanley Zell, in a stripped Thomas Flyer, and Frank S. Hurst, driving a stripped Mark XLVII Columbia. Hurst won the event in 7:33 2-5, Zell being put out of the running by an accident. The dust was very thick on the track, and during the second mile Zell became blinded by it and tore into the fence back of the Casino, ripping off eighteen boards and badly damaging his machine. Fortunately, he escaped without personal injury.

Caillois, who took a fourth place on a Brasier in the last Gordon Bennett, is said to be engaged by the E. R. Thomas Motor Company to drive the Thomas in the Vanderbilt Cup race.



FRAYER-MILLER VANDERBILT CUP CAR WITH 110-H.P. MOTOR AIR-COOLED BY FORCED DRAFT.

FRAYER-MILLER CUP RACER.

Differing in a number of essential features from the conventional type of gasoline racing car, the three Frayer-Miller air-cooled machines entered for the Vanderbilt Cup elimination trials are decidedly interesting from a mechanical point of view. The illustration gives a good idea of the general appearance of the machine that has already been finished and given road tests; a speed of 90 miles an hour has been attained, the builders state.

A short wheelbase is one of the noticeable features of the car, and this contributes considerably to the lightness of the machine, which weighs but 1,734 pounds. The motor is, of course, of the Frayer-Miller type, with forced draught through cylinder jackets for cooling. Though rated at 110-horsepower, the builders claim that 150-horsepower can be developed. At the lower rating there is one horsepower for every 15.76 pounds; or, at the higher rating, one horsepower for every 11.56 pounds weight of the complete car. The cylinders, four in number, have a bore of 7¼ inches and a stroke of 6½ inches.

Another interesting feature is the transmission. This is of the Belden type, mounted on the rear axle, and gives a direct drive on each speed; the Belden transmission has already been fully described in THE AUTOMOBILE. The employment of the device under such strenuous conditions will doubtless test it thoroughly.

Only one of the three cars entered is as yet on the road, the other two being, however, well under way. Mr. Belden, the inventor of the transmission used, will drive one of the cars now in the factory, and Mr. Moscovics, the New York representative of the manufacturers of the car, will drive the other. The completed car will be handled by Lee Frayer, the designer of all three, who is shown at the wheel with his mechanic, Mr. Forse, beside him.

MR. BENNETT LEAVES THE RAMBLER.

George W. Bennett, who for the past twenty-one years has been identified with the Thomas B. Jeffery manufacturing interests, and who is prominently known as the general sales manager of Thomas B. Jeffery & Co., makers of the Rambler automobiles at Kenosha, Wis., has resigned his position, to take effect July 31. After that date he will occupy the position of general sales manager with the Knox Automobile Company, of Springfield, Mass., having acquired an interest in that corporation. Prior to leaving the Rambler factory, Mr. Bennett will divide the different departments, so that in the future there will be no sales manager possessing the powers that he has had in the past, the selling department being divided into three divisions, all of which will have a separate head under the general supervision of Charles T. Jeffery.

Mr. Bennett has gained a record in the automobile business of which he has every reason to feel proud. He has been a prominent factor in making the Rambler factory one of the largest business enterprises in the automobile line in the country, and probably in the world. The best wishes of his host of friends will go with him in his new business alliance, in which his vigorous personality will make itself evident from the outset.

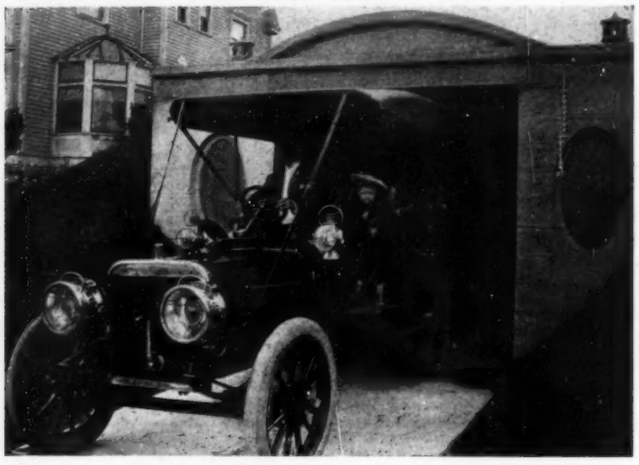
A tourist's automobile to "do" Berlin is the latest appearance in the streets of the German metropolis, where the vehicle, with its driver, guide and crowd of passengers caused no little excitement. Twenty-two of the latter can be seated. While this car is intended for town work only, another one is about to be put on for drives to Potsdam and back.

STARTING LIFE EARLY IN THE CHAUFFEUR'S SEAT.

Francis Richards, of Portland, Maine, is doubtless the youngest chauffeur in the world, but owing to the difficulty of finding anyone who has seen him drive nothing can be said about his prowess on the road. Judging from the photograph, Mr. Richards is entirely at home in his Thomas Flyer, and appears to have the big car under perfect control.

A MODEL PRIVATE GARAGE.

TACOMA, WASH., July 6.—A new private garage built on rather novel lines has been completed for Richard Vaeth, of this city, who desired to keep his car at his home. This is Mr. Vaeth's second year as an automobilist, and when he decided to build a garage for his six-cylinder Ford, it was found that to build one on ordinary lines would necessitate the construction of a new roadway. The ground is on a hillside, and Mr. Vaeth conceived



PRIVATE GARAGE BUILT INTO A HILL.

the idea of building right into the bank from one side of the lot. The engraving shows how this has been accomplished. The entrance is but a few feet from the walk, and over the top the grass is still growing. The garage is entirely of cement and cost $1,000. A gasoline tank of two-barrel capacity is underground, just outside the garage. A garage along similar lines has also been built by George Lewis Gower.

ANOTHER RECORD FOR "OLD BETSY II."

HARTFORD, CONN., July 10.—In the races of the Hartford Yacht Club, June 30, the motor boat Columbia, owned by President M. J. Budlong, of the Electric Vehicle Company, established a new record of 2:31:27 for the Hartford-Fenwick course of 49 3-4 miles; even better time would have been made except for a strong south wind. It is noteworthy that the engine of the Columbia is the one which was taken from Old Betsy II, the 35-horsepower car which created the Chicago-New York record of 58 hours and 35 minutes.

The Electric Vehicle Company's spur track is in constant use and heavy shipments are being made daily. Great care is exercised in loading vehicles for transit, only box cars in perfect order being used. The electric assembly department of the factory is especially busy meeting the demand for victoria-phaetons and runabouts.

TERMINAL PRESSURES IN EXPLOSION MOTORS.

Editor THE AUTOMOBILE:

[339.]—Will you kindly inform me, through the columns of your interesting paper, as doubtless the information would be of interest to many automobilists as well as myself, why gasoline engines have mufflers, that is, why the stroke is not slightly lengthened or the bore slightly increased in diameter until the explosive force of the charge is reduced to atmosphere before the exhaust opens, which would seem to utilize more of the expansive force of the charge and doing away with the noise.

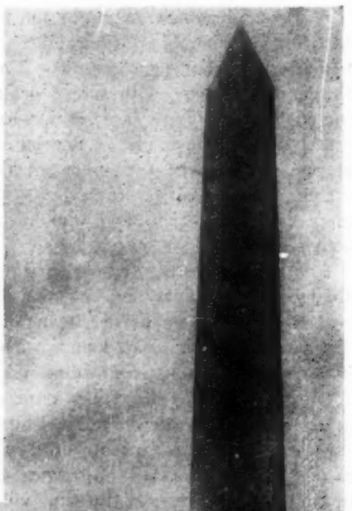
Washington, D. C. C. F. J.

Our correspondent is in error in supposing that the system he proposes has not been tried by automobile builders. Though differing in plan the principle is the same as that employed in the construction of the motor of the "Compound" car. In this motor there are three cylinders, two of them ordinary "high pressure" cylinders, and the third a low pressure cylinder of larger diameter, set between the two smaller cylinders. The high pressure cylinders exhaust into the low pressure cylinder and the gas is still further expanded on the working strokes of that cylinder. The terminal pressure in this cylinder is stated by the builders to be from three to five pounds below the atmosphere. This is said to result in a scavenging effect on the high pressure cylinders, thereby causing them to take in fuller charges of combustible gas on the suction stroke. We suggest that our correspondent write to the builders of this car whose announcement will be found in the advertising pages.

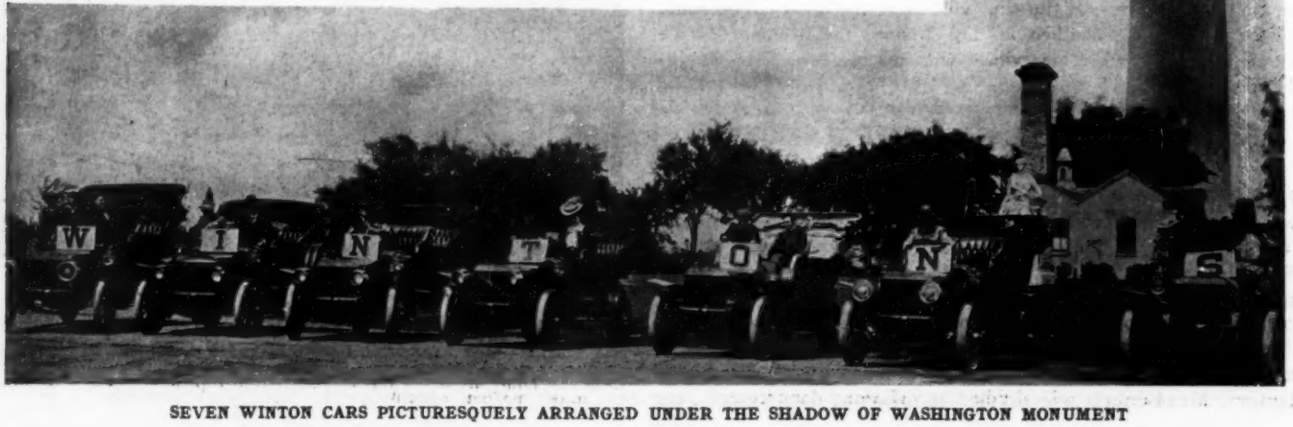
MOTOR RUNNING ON ALCOHOL.

GRAND RAPIDS, MICH., July 9.—Probably the first successful American alcohol marine motor has been produced by the Wolverine Motor Company, of this city. The motor will probably be adapted to meet the requirements of automobiles and has the peculiarity of being able to run on either gasoline or denaturized alcohol.

For a number of years the company has been experimenting with alcohol, believing that the time would come when it could be used as a fuel. Although some success has followed efforts in Germany to use denaturized alcohol, little has been done hitherto in this direction in the United States.



Successful tests have been made of the new motor and the Danish government has already ordered eight of them for use in its naval launches. After a test the Austrian Fish Commission is said to have commended them.



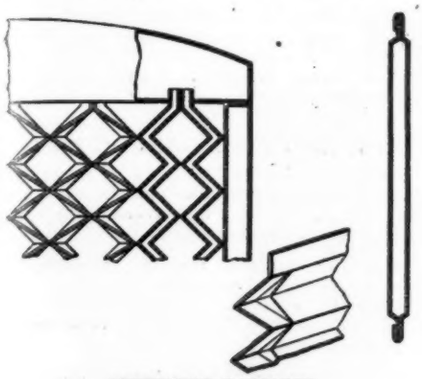
SEVEN WINTON CARS PICTURESQUELY ARRANGED UNDER THE SHADOW OF WASHINGTON MONUMENT

Patents

Radiator Construction.

Nos. 824,492 and 824,493.—D. McR. Livingston, of New York City.

A form of construction in which the appearance of squared tubes is given by cor-



LIVINGSTON RADIATOR.

rugating the strips of brass or copper as shown. In order to give the maximum strength to the seams, the edges of these strips are turned over, as the detail shows, besides being soldered. Another feature is the diagonal direction of the seam, which the drawing clearly shows.

Brake Support and Radius Rod.

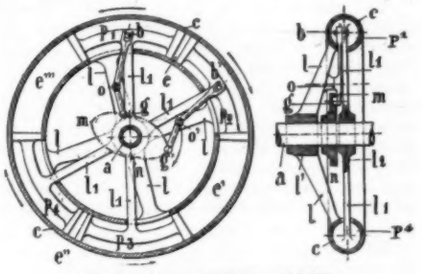
No. 824,215.—C. O. Snyder, of New York City.

The claims in connection with this device appear to cover the form of combination radius and brake support used by a number of foreign cars. The radius rod is stamped out of steel, with a turn buckle adjustment at its small end, and it supports both the brake shoes, which in the form shown are of the expanding type, and also the lever by which the brake shoes are caused to engage the drum.

Rotary Explosion Motor.

No. 824,559.—H. L. Maillard, of Paris, France.

This is an odd design of piston motor, having a continuous circular cylinder revolving like a flywheel. The general construction is shown diagramatically in the drawings, in which *a* is a stationary shaft, *c* is the revolving circular cylinder, which is supported by arms *l l*, and is slotted at its inner circumference for the supporting arms *l l* of the pistons p_1 p_2 p_3 p_4, which arms are also loose on *a*, and are connected oppositely in pairs. The pistons are double-ended, and the spaces *e e′ e″ e‴* form the explosion chambers, to and from which the mixture and exhaust gases are conveyed by suitable valves and piping not shown. The volume of the several explosion chambers is varied for the successive operations of the Otto cycle by causing the pistons to approach to and recede from each other, and this movement of the pistons is produced during the idle strokes, and made to propel *c* during the power stroke, by means of the levers pivoted on the arms *l l* at *o o′*. The outer ends of these levers engage the pistons at *b b′*, and their inner ends carry rollers which run in a stationary patch cam, indicated by the chain line *m n*. As these rollers move to and from the center the



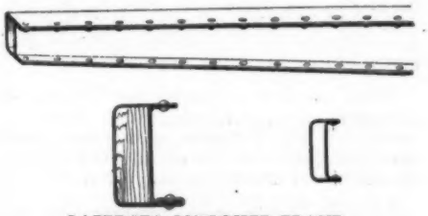
ROTARY EXPLOSION MOTOR.

pistons are caused to oscillate, and motion is imparted to the arms *l l*. With the parts in the position shown and with *c* turning clockwise, the operations of explosion, exhaust, suction and compression respectively are about to take place in *e e′ e″* and *e‴*.

Frame Construction.

No. 824,550.—L. Lazerges, of Issy-les-Moulineaux, France.

A double channel section formed by riveting together two pressed steel channels, as shown. The space between the two channels may be filled with wood if desired, and the lower flange of the outer channel may be doubled over the flange



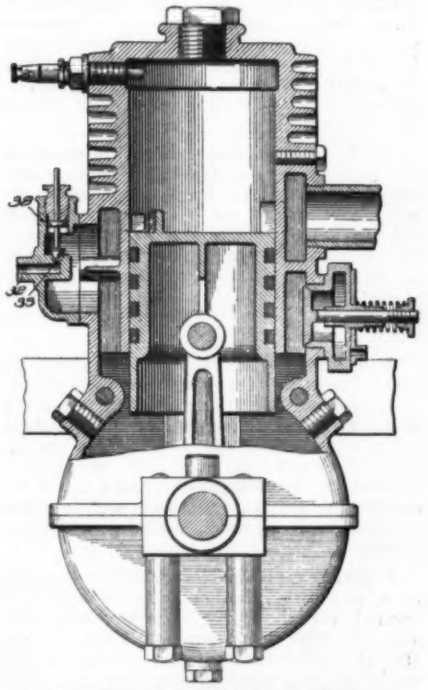
LAZERGES COMPOSITE FRAME.

of the other, to give greater strength in tension, as shown in the lower left-hand view.

Two-Cycle Engine.

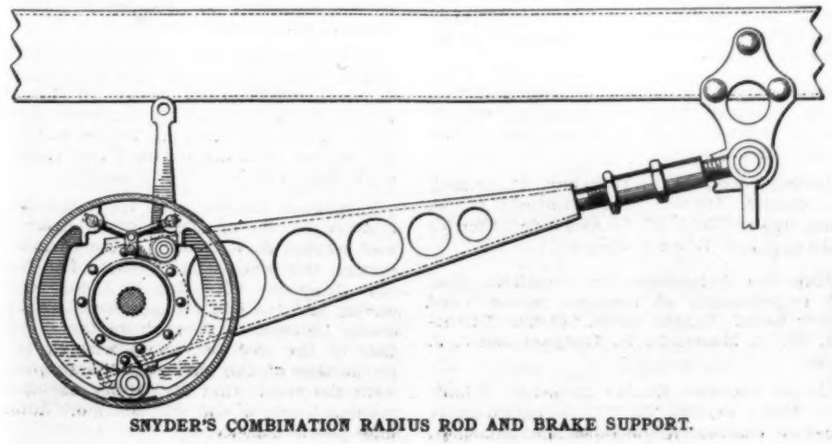
No. 823,450.—B. F. Stewart, of Chicago, Ill.

This invention covers a special device for feeding the liquid fuel to the air in the crankcase as the latter passes to the transfer port in the cylinder. It is intended to dispense with the need of a carbureter or other external vaporizing device. The gasoline pipe is connected at *32*, and the gasoline passes through an orifice closed by the valve *33*, on whose stem is a small piston *38* working in a cylinder as shown. The space about the piston is presumably in



STEWART'S TWO-CYCLE ENGINE.

communication with the outer air, though this is not specified. The compression in the crankcase lifts *38* and opens the valve, allowing the gasoline to run down and spread over the iron surfaces below it. It is then vaporized by the rush of air through the transfer passage. The deflector plate *42* is added to cause the air to strike the gasoline as forcibly as possible.



SNYDER'S COMBINATION RADIUS ROD AND BRAKE SUPPORT.

NEWS AND TRADE MISCELLANY.

The Liberty Automobile Company, Pittsburg, Pa., has leased the building recently occupied by the Monarch Automobile Company, of that city. It will be used for storage purposes.

Plans for a new factory for Wheeler & Schebler, of Indianapolis, Ind., manufacturers of the Schebler carbureter, have been completed and the actual work of construction will commence August 1.

John L. Poole, who recently left the Oldsmobile company to become foreign representative of the Aerocar company, goes to Europe in August to take up his new duties.

The Standard Automobile Company, Pittsburg, Pa., is adding two stories to its garage, which will be equipped with an elevator. There will be a Packard repair department on the first floor and top, and paint department upstairs.

The Oak Park Power Company has been organized in Flint, Mich., to furnish power to the Buick and Weston-Mott automobile companies. Charles S. Mott is president; Charles M. Begole, vice-president; William G. Doolittle, secretary and treasurer.

The latest foreign manufactured motor car to be represented in the Pittsburg territory is the Darraco, which will be handled by Ernest D. Nevin. His demonstrating car will be kept in the Fort Pitt Automobile Company's garage in the East End.

The Crescent Auto Top Company, of New York, of which James C. Stoops is manager, has removed to 58 West Thirty-fourth street, occupying an entire building. A specialty is made of high-grade, made-to-order tops and considerable work is done for the local trade.

M. A. Gilman, who recently disposed of his interest in the Hampden Auto Company, of Westfield, Mass., has taken the sales agency for the Haynes automobiles for Hampden county, Mass. Business will be conducted under the firm name of The M. A. Gilman Distributing Agency. In addition to the office, there will be a private garage, used only for the storage and repairs of demonstrating cars.

A. C. Hill and W. W. Brewster, of Greensburg, Ind., have succeeded to the retail business of the Columbia Electric Manufacturing Company, of Indianapolis, taking possession July 1. The garage formerly owned by the new interests at Greensburg has been purchased by I. C. Mitchell and J. C. Hill, who will continue to hold the agencies for the Olds and Leader cars.

A garage and repair shop will be opened in a new brick building, 45 by 150 feet, erected for the Lake Forest Automobile and Machine Company, of Lake Forest, Ill. It is expected that the building will be ready for occupancy about July 15. Lake Forest is one of the most attractive suburbs of Chicago, and has about 200 automobiles. The new garage will be equipped with the latest appliances for repairing and caring for automobiles of all types.

The Remy Electric Company, of Anderson, Ind., is erecting a new plant in South Anderson, comprising a main building 40 by 350 feet, and two smaller buildings 50 by 110 feet and 30 by 80 feet, respectively. The materials used are brick and steel throughout, and the buildings are modern in every respect. The laboratory and office building is separated from the manufacturing plant. Grounds will be laid out with a view to artistic effects.

The Hartford Suspension Company states that almost all the entrants in the Glidden tour have Truffault-Hartford shock absorbers applied to their cars. Reports received by President Hartford at the company's factory, West and Clarkson streets, New York City, from representatives in Buffalo, Cleveland, Chicago and other cities, tend to confirm the report. E. A. Robertson, sales manager of the company, left for Buffalo on Wednesday, to witness the start of the Glidden tour from that city.

Autoists who attended the recent hill-climbing contest at Mt. Carmel, Conn., say that, in view of the heavy rain, slippery roads, and good time made by the contestants, it was one of the most remarkable efficiency trials of the season. The incline negotiated on York Mountain is three-fourths of a mile long, with a grade averaging over 20 per cent. Of the twenty-five entrants the best time, 3:58, was made by R. L. Lockwood, in a 16-horsepower, two-cylinder Reo touring car, taken from regular stock. The prize cup was awarded to the owner, Thomas Whitfield, of Reo Motor Agency, New Haven, Conn.

Announcement is made by the Rossel Company of America, importers of the Rossel Car of Sochaux-Montbeliard, France, that the French company this year will manufacture, in addition to their four-cylinder motors as heretofore, three types of six-cylinder cars, of 40, 60 and 80 horsepower. The Rossel company state that they are now prepared to take orders for a few of these cars. William S. Ottmann, of the J. Ottmann Lithographing Company, of New York, has just placed an order with the New York firm for a new 80-horsepower, six-cylinder Rossel to be delivered early in 1907. The cylinders will be 125 x 140 mm. in diameter. The bonnet of the car will hardly be larger than that on some of the cars of American manufacture, as the cylinders are cast in pairs and the camshaft control gear so arranged as to occupy very little space. The car will be equipped with the new multiple metallic disk clutch which, the makers state, makes it possible to start from a standstill on the high gear.

RECENT INCORPORATIONS.

Williams Motor Carriage Co., Akron, O. Capital stock, $1,000,000. To manufacture automobiles.

Central Automobile & Supply Company, St. Louis, Mo.; capital, $10,000. Incorporators: Charles W. Schevlin, John W. Schevlin, H. H. Artz and others.

Rotary Motor Car Co. of America, New York. Capital, $100,000. Directors, W. B. Vause, New York; B. C. Vause and G. W. Vause, Brooklyn.

Buckeye Automobile Company, Cincinnati, O.; capital, $10,000. Incorporators: G. F. Jung, Justus Kohl, M. L. Alexander, Charles Erbacher and Edward Simper.

Hamilton Automobile Co., Hamilton, Ont. To manufacture automobiles, motors and motor boats. Capital stock, $40,000. Directors, W. H. Moore, H. H. Hodgson and J. J. Scott.

Cooper Gasoline Engine Company, Winnipeg, Man.; capital, $50,000; to manufacture gasoline engines, automobiles and launches. Provisional directors: E. S. Cooper, J. Shutt and D. G. McEwan.

Motor Service Company, Minneapolis; capital stock, $12,000. Incorporators: F. L. Loomis, B. G. Baker, C. L. Stacey, W. W. King and F. D. Merrick.

B. & O. Auto Line, Detroit, Mich.; to buy, sell, build and operate automobiles; capital stock, $5,000. Incorporators: L. E. Bussey, W. H. Olmstead, W. S. Anderson, E. S. Anderson and F. G. Withrow.

Kiesel Motor Car Company, Hartford, Wis.; capital stock, $50,000. Incorporators: Louis K. Kiesel, Otto Kiesel, Adolph P. Kiesel, William L. Kiesel, George A. Kiesel and H. K. Butterfield.

THE GROWING GARAGE LIST.

Kenosha, Wis., is to have a garage—a much-needed convenience—and the place will be ready for use in a few weeks. The location is on Milwaukee avenue.

A garage has been opened in Fitzgerald, Ga., by Johns & Armatrout. Part of the Fitzgerald Wagon Factory is being used as a temporary location, pending the securing of a permanent place.

The new garage for the Locomobile Company on Newbury street, Boston, is progressing rapidly; the foundation is practically finished and work on the superstructure has commenced.

The Toledo Motor Car Company, of Toledo, O., has arranged to erect a garage on Madison street, opposite its present location. The new building will be about 80 by 100 feet and one story high, affording about double the space available in the present garage.

Automobilists in Plainfield, N. J., have banded together and organized The Owners' Garage of New Jersey, with a capital of $25,000, in order to have up-to-date facilities for taking care of their machines, though at a distance from the city, and also to economize in maintenance cost. A garage will be built in Plainfield, and the association plans to build other garages in places where the need is the same as in Plainfield. Members will, of course, have the preference in everything. Active work is being carried on by a committee consisting of G. M. Kirkner, Daniel F. Ginna, C. W. Hall and Benjamin Wood, all of Plainfield.

SOME NEW 'BUS LINES.

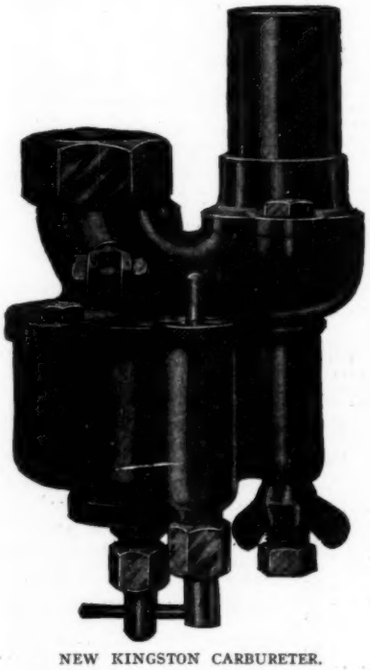
Albion R. Clapp, the wealthy railway promoter of Wellesley, Mass., who is heavily interested in the Worcester & Holden, established a half hourly automobile 'bus service between Rutland and Jefferson, where his electric line ends. He has placed a Knox in commission.

Seven cars have been ordered for an automobile stage line to operate on a route in Texas, including the towns of Lubbock, which will be the headquarters town, Canyon City, Hale Ceter, Running Water, and Tulia. Two of the cars are on hand and ready for work, and will be running shortly.

In spite of the fact that Worcester, Mass., is noted for the excellence of its street railway service, A. K. Miller, of the local White garage, this week began making half hourly trips from the City Hall to Lake Quinsigamond and the ball grounds with a six passenger Oldsmobile. Though the fare is double that of the electrics, those wishing to get to the lake quickly patronize the automobile, with the result that Mr. Miller has done a rushing business and will add more automobiles to the service.

SOME SPECIALTIES FOR THE BUYER.

NEW KINGSTON CARBURETER.—A carburetter of a new model has been brought out by Byrne, Kingston & Co., of Kokomo, Ind., manufacturers of the Kingston carbureters and other automobile accessories. The new carbureter, of which an exterior view is shown in the accompanying illustration, is known as Type K. The float is of cork sheathed with metal, of the annular type, with the spraying nozzle in the center, so that grades do not affect the height of the



NEW KINGSTON CARBURETER.

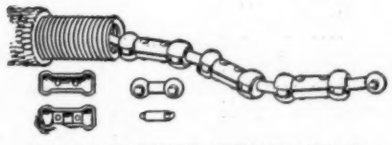
gasoline in the stand pipe. The compensating air valve is controlled by an adjustable helical spring acting against the suction of the engine, while the regular air inlet, directly under the spraying nozzle, can be varied in area by means of a screw cover. A throttle valve is incorporated in the carbureter, and this may be either a piston valve or a butterfly valve; the piston valve is of the balanced type. The spray nozzle is not a part of the main casting, but is separate and screws into place, so that nozzles of different sizes may be tried and the most efficient one used. The new Kingston carbureter is highly finished, and is made to suit any size or type of gasoline motor.

VULCANIZING WITH ACID.—A process by which all kinds of tire repairs may be made in a permanent manner, equal, the manufacturers state, to ordinary heat vulcanizing, is offered to the automobiling public by the M. & M. Manufacturing Company, of Akron, O., the substance used being known as the M. & M. cement and acid cure solution. It is claimed that this process is practically vulcanization without heat. Patches may be attached, cuts mended, inner tubes spliced, rubber treads applied and various other kinds of tire work done without the aid of steam or other heaters. The acid and cement used comes in cans holding from one-half pint to a gallon, and for the touring automobilist special handy tire repair sets are put up. Treads may be applied to old tires by roughing the tire with a steel brush or rasp, coating tire and inside of tread with cement, applying tire, flowing acid over cement and then binding the tread in place with cloth bandages and inflating the tire to bring the tread hard against the shoe while the cure is taking place. The makers state that anyone without previous experience can put on a new tread with satisfactory results, and that work done with the acid cure cement and solution is permanent.

MACHINE WORK.—The execution of all kinds of high-class machine work is the specialty of the Rhode Island Machine Company, of 430 Kingsley avenue, Providence, R. I., of which Walter M. Jordan is manager. Automobile engines, automobile accessories, jigs, tools and gear cutting are among the specialties this concern is prepared to handle.

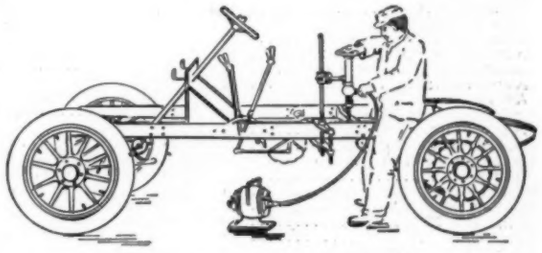
NEW TUBULAR COOLER.—A new cooler for automobile engines has been placed on the market by the Wright Cooler and Hood Manufacturing Company, of 335 Wabash avenue Chicago, Ill. The main points of superiority claimed for this cooler are that the combination of tubes and fins is such that the tubes are absolutely unaffected by vibration, and therefore not subject to leakage from this cause; that the air spaces are large and offer little resistance to the flow of cooling draughts, making the cooler an efficient one; and that freezing has little effect on the cooler, repeated freezing having failed to burst the tubes. Tubes, fins and plates are made of what is known as quarter-hard cold rolled copper. The Wright company also manufacture hoods, mud-guards, metal dashes, water tanks and gasoline tanks.

POLISHING DEVICE.—It is impossible to keep an automobile looking its best unless all the brasswork is well polished, bright and shining, and the task of polishing is a time-consuming one. Anything that will save time in a garage of any importance is



DETAILS OF COATES FLEXIBLE SHAFT.

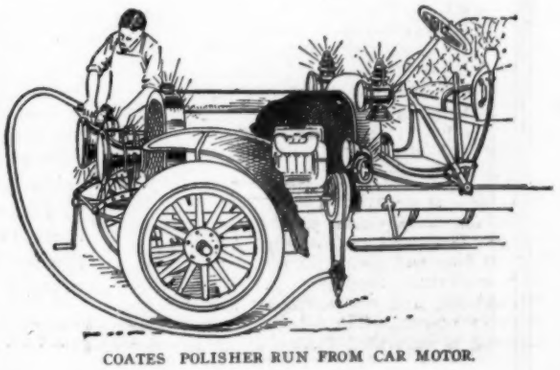
a good proposition, for customers are given better service and the efficiency of the garage force increased. A device intended to save time in all kinds of polishing and buffing is manufactured by the Coates Clipper Manufacturing Company, of 237 Chandler street, Worcester, Mass. As the illustrations show, this consists of a flexible shaft terminating at one end in a spindle adapted to carry buffing and polishing wheels, and at the other in a pulley. A belt runs from the pulley to the flywheel of the motor of the car to be worked on, and the pulley end of the flexible shaft is fitted with a hook arrangement by which it may be secured to the floor under the car. The motor is started, causing the shaft and the buffing or polishing wheel to revolve, giving an easy quick and effective method of polishing—a method that enables the crevices and narrow places to be properly cleaned as thoroughly as the more accessible parts. This apparatus is also made to be run by a small electric motor, which is coupled to the end of the shaft in place of the pulley. With this combination the motor of the car need not be used, and the driving end of the shaft is readily moved to any point. A special form of flexible shaft is employed, consisting of a series of short ball-and-socket links of hardened steel, which the manufacturers state will run at high speed easily and smoothly, without heating or kinking. This shaft is made in sizes that will transmit from 1 to 10 horsepower, this size being used for speed-indicating instruments and the like, to 150 horsepower. Another feature of the outfit is that it may be used for drilling small holes, up to three-eighths



COATES ELECTRIC POLISHING OUTFIT.

of an inch, or even one-half inch, by substituting a special breast drill for the buffing spindle. This is an extremely handy arrangement, especially for working under the car and in places where it is difficult or impossible to work an ordinary hand drill on account of the contracted space.

SELF-TAPPING FAUCETS.—A faucet that can be inserted quickly in any tin can, and will hold firmly and without leaking, according to the statements of the manufacturers, has been placed on the market by the Self Tapping Faucet Company, of 227 Campbell avenue, Detroit, Mich. The novel feature of this handy device is a threaded shank tapered to a sharp point. When it is desired to insert the faucet into a can, the point is forced into the tin until the thread catches, and the shank is screwed in until the washer at the base of the screw is pressed against the can, making a close joint. The screw enlarges the hole as it goes in and makes a tight fit. Self-tapping faucets are made in various styles for handling thick or thin oils, paints, varnishes and the like. The company has a Western office at 607 Mutual Life Building, Seattle, Wash., which is rapidly establishing a trade on the Pacific Coast. The device is very apt to become popular with automobilists and with the users of motor boats.



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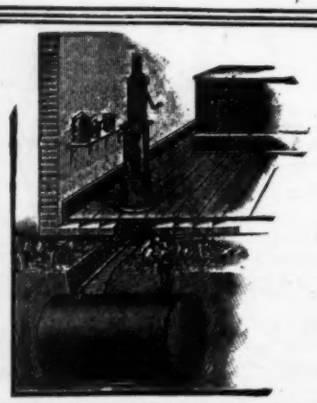

THE NATIONAL GASOLINE TANKS

¶ The National Long Distance Gasoline Storage Outfit, which permits of placing the supply tank under ground, the pump being inside the building. In perfecting this outfit we have observed to the letter the rules of the Underwriters' Laboratories, and can recommend it to be the safest and most economical way of handling gasoline ever devised ¶ This pump is one of our latest, Double Cylinder, which in operating there is no lost motion, every movement of the handle pumps and measures oil, saving time, labor and money. ¶ This outfit is especially designed for Automobile Garages. ¶ Ask for Catalogue.

THE NATIONAL TANK CO., Inc., DAYTON, OHIO